

AUG 16 1930

THE JOURNAL OF LAND & PUBLIC UTILITY ECONOMICS



MULTI-FAMILY HOUSING IN AMERICAN CITIES

COLEMAN WOODBURY

LEGAL VERSUS ECONOMIC PRINCIPLES IN VALUATION

D. F. PEGRUM

MUNICIPAL OWNERSHIP AND CHANGING TECHNOLOGY
OF ELECTRIC INDUSTRY

PAUL J. RAVER

NEW YORK STATE STUDIES REGULATION

JOHN D. SUMNER

POPULATION AND PEAK LAND VALUES

H. MORTON BODFISH

FARE PROBLEM OF ATLANTA STREET RAILWAYS

JAMES M. WRIGHT

MEASUREMENT OF RISK IN UTILITY INDUSTRIES

JOHN F. REINBOTH



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The contents of the *Journal* are indexed in the *Industrial Arts Index*.

Entered as second-class matter, January 5, 1925, at the post-office at Chicago, Illinois, under the Act of Congress of March 3, 1879. Acceptance for mailing at special rate of postage provided for in section 1103, Act of October 3, 1917, authorized October 12, 1922. Printed in the United States of America.

Subscription Rates: \$5 a year; \$1.25 a copy. Remittances may be made by personal checks, drafts,

post-office or express money orders, payable to the Institute for Research in Land Economics and Public Utilities, Chicago, Ill.

Agents of the *Journal* in Great Britain, B. F. Stevens & Brown, Ltd., 4 Trafalgar Square, London, W. C. 2.

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Editorial and Business Correspondence: Letters regarding editorial matters should be addressed to the Editor, Northwestern University, 337 E. Chicago Ave., Chicago, Illinois. Letters concerning subscriptions or advertising should be addressed to the Business Manager of the *Journal*, Northwestern University, 337 E. Chicago Ave., Chicago, Illinois. Advertising rates furnished on application.

PUBLISHED QUARTERLY BY THE INSTITUTE FOR RESEARCH IN LAND ECONOMICS AND PUBLIC UTILITIES, 337 E. CHICAGO AVE., CHICAGO, ILL.

THE JOURNAL OF LAND & PUBLIC UTILITY ECONOMICS

RICHARD T. ELY, *Editor-in-Chief*

E. W. MOREHOUSE, *Managing Editor*

HELEN C. MONCHOW, *Assistant Editor* G. C. LEININGER, *Business Manager*

The contributors to this number include:

Coleman Woodbury, Research Associate in the Institute; Assistant Professor of Land Economics, Northwestern University.

D. F. Pegrum, Assistant Professor of Economics, University of California.

Paul J. Raver, Research Associate in the Institute; Assistant Professor of Public Utilities, Northwestern University.

John D. Sumner, Assistant Professor of Economics and Public Utilities, University of Buffalo.

H. Morton Bodfish, Executive Manager, United States Building and Loan League; Assistant Professor of Economics and Real Estate, Northwestern University.

James M. Wright, Professor of Economics, Agnes Scott College, Decatur, Georgia.

John F. Reinboth, Statistical Department, Commonwealth Edison Co., Chicago; Lecturer in Economics, Northwestern University; formerly member of the staff of the Institute.

E. Orth Malott, Assistant Professor of Economics, Northwestern University.

Roy L. Reierson, Research Instructor in the Institute; Lecturer in Economics and Finance, Northwestern University.

George B. Logan, Cobbs & Logan, St. Louis, Missouri.

Helen C. Monchow, Research Assistant in Land Economics in the Institute.

Robert Riegel, Professor of Statistics and Insurance, University of Buffalo.

Ben W. Lewis, Professor of Economics, Oberlin College; temporarily in the Department of Economics, University of Michigan.

Hubert F. Havlik, Lecturer in Economics, Northwestern University.

Fred E. Clark, Professor of Economics and Marketing, Northwestern University.

George S. Wehrwein, Professor of Agricultural Economics, University of Wisconsin.

Herbert E. Dougall, Assistant Professor of Finance, Northwestern University.

Albert G. Hinman, Research Associate in the Institute; Assistant Professor of Land Economics and Real Estate, Northwestern University.

E. W. Morehouse, Research Associate in the Institute; Associate Professor of Economics, Northwestern University.

STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, ETC., REQUIRED BY THE ACT OF CONGRESS OF AUGUST 24, 1912,

Of The Journal of Land and Public Utility Economics, published quarterly, printed at Madison, Wis., published at Chicago, Ill., for April 1, 1930.
State of Illinois,) ss.
County of Cook

Before me, a notary public in and for the State and county aforesaid, personally appeared G. C. Leininger, who, having been duly sworn according to law, deposes and says that he is the business manager of the Journal of Land and Public Utility Economics and that the following is, to the best of his knowledge and belief, a true statement of the ownership and management of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, embodied in section 411, Postal Laws and Regulations, printed on the reverse of this form, to wit:

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(Seal.)

EDWARD B. DAVIDSON. (My commission expires, December 24, 1932.)

G. C. LEININGER, *Business Manager*.

THE JOURNAL OF LAND & PUBLIC UTILITY ECONOMICS

AUGUST
1930



VOLUME VI
NUMBER 3

THE TREND OF MULTI-FAMILY HOUSING IN CITIES IN THE UNITED STATES

By COLEMAN WOODBURY

THE acute general housing shortage felt in many American cities during and immediately after the world war stirred up strenuous protests from many quarters and resulted in a variety of remedial activities. The metropolitan daily papers commented disparagingly on the "rent profiteer" who was often referred to in the less restrained phrase, the "rent hog." Chambers of Commerce and other groups helped to organize extra-legal rent commissions, which relied on publicity and the force of public opinion. Some of the states with large urban centers created official rent-control commissions with power to restrict eviction of tenants who continued paying the same rent as they were accustomed to pay or some "reasonable" increase. Somewhat later other commissions probed charges of conspiracy among building material dealers and labor union officials to keep up building costs and secured some convictions. Government aid in financing dwelling construction was seriously considered. Some proposals were made for bringing

the provision of housing into the class of public utility industries. Finally, the serious lack of accurate facts, statistical and otherwise, on housing and residential construction was clearly revealed and demands were immediately made for more satisfactory data on the economic phases of housing.

But as the general shortage of housing facilities was abated and the pinch of abnormally high rents was no longer felt by the more influential and more vocal classes of the community, interest in housing problems declined and, with a few notable exceptions, has taken but a very minor share of public attention during the last five or six years. The superficial, as well as the more penetrating analyses of urban housing conditions have been neglected; the promising aids and remedies (with the possible exception of the zoning movement) which were advanced, as well as the nostrums, have been quietly shelved. Probably the most enduring result of the post-war shortage has been the work of two departments of the Federal

Government, the Division of Building and Housing in the Department of Commerce and the Bureau of Labor Statistics in the Department of Labor, in collecting and publishing data on housing activity. Their work has not been supplemented in most cities, as it should have been, by the unbiased collection of facts of a more detailed nature but it has supplied the broad outlines of residential construction in American cities during the last eight or ten years.

The present study makes use of one of the most interesting sets of data published by the Bureau of Labor Statistics—the figures on permits for new residential construction by types of dwellings from 1921–1928.¹ As published, these data have revealed a general increase in apartment-house construction with a corresponding decrease in new single-family homes but no adequate analysis has been made of the movement. One or two broad classifications and the pointing out of a few unusual or extreme instances have been the limits of the treatment and interpretation of the figures. The purpose of this study, one section of which will be summarized in this article, is to go behind the general fact of apartment-house growth to the forces and conditions which are connected with it and which seem to be influencing it. The chief obstacle, of course, has been the scarcity of dependable supplementary data. At least a dozen promising hypotheses have been abandoned without trial, because the facts for classification or correlation were either not obtainable or bore marks of careless or prejudiced collection.

Implications of Multi-Family Housing

The bearing of this multi-family house movement (if unchecked) on city planning, zoning, subdivision, highway development, public utility installation, as

well as on the less tangible economic and social institutions and habits of urban dwellers, will only be mentioned here. Fortunately many of these points of contact are obvious. Continued concentration of population in apartment houses makes necessary a re-examination of the standards of air, light, and yard space in residential districts. Public play areas will have to be enormously increased and should be increased in those sections where land values are relatively high because of potential apartment house use. Street areas and all public utility facilities, municipal and otherwise, sufficient for the increased density of residential population must be anticipated and planned. Many persons will deem advisable the increase of these facilities in already built-up areas rather than their rapid extension into recently subdivided areas, in which the absorption of lots will be slowed up by the multi-family trend. Prevailing ideas of the correct proportion between zoned apartment and single-family areas may have to be revised drastically. The possibility of added regulations (zoning, educational, or otherwise) aimed to check the virulence of obsolescence, which has rapidly blighted nearly all apartment-house districts in the past, should become a consideration of wide concern. The use to be made of money formerly spent by many families in buying a single-family house will be a fact of more than passing significance to business men, as well as to economists.

One step removed are the effects of the probable change in living habits of apartment dwellers. Will they patronize neighborhood and sub-center shopping districts more or less than those

¹ Bureau of Labor Statistics, *Bulletin* Nos. 347, 368, 377, 424, 449, and 469; 28 *Monthly Labor Review* (June, 1929). Mr. Ethelbert Stewart, Commissioner of Labor Statistics, has been most patient and helpful in supplementing and completing the published material.

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who live in one- and two-family houses; will their consumption per family of gas, light, and power be diminished markedly; will their demand for transportation facilities change; will more transit service to outlying parks and amusement centers be required? Finally, how will schools, community organizations, and churches be affected and what adjustments must they make?

The probable implications of the multi-family trend just suggested, with many combinations and some additions, constitute the practical application and justification of this study. But the picture must not be overdrawn. Even the rapidly growing cities of this country are not made over in an eight-year period. The elements of a fundamental change, however, are in this movement in residential building and will force themselves on popular attention if continued for another decade or so. The wise policy would seem to be to analyze the facts until some defensible judgment can be made as to the probable continuance of the movement. If the trend does prove to be more than a passing phenomenon under present conditions, then steps should promptly be taken to change the conditions or to adjust the other economic phases of cities to it. Decision on this alternative of modification or adjustment is probably the most difficult step in the whole process and must be taken only after analysis of facts and not in the fervor of sentiment and prejudice.

The Period Studied

The period from 1921 to 1928 is in many ways an excellent unit for the study of housing trends. Residential construction was active during the en-

tire period; 1921 marked the first stages of the recovery from the war and immediate post-war depression in building; and 1928 was the last year of active building before the present depression.

Housing statistics for the years prior to 1921, comparable to those from 1921 to the present, are not available. However, the *value* of residential buildings for which permits were issued in 189 cities in 1920 was \$440,709,665 and the number of buildings was 76,034. In 1921 the same cities issued permits for 142,365 residential buildings, totaling \$869,453,409.² This indication of the breaking of the building depression is substantiated by the data on building contracts awarded in the same years in 36 states.³ The monthly average value of residential building contracts awarded rose in 1919 to \$77,465,000, fell in 1920 nearly to the war level (\$51,669,000), but rose sharply in 1921 to \$80,139,000. From this point the increase was steady to \$222,664,000 in 1925 and the high mark was reached in 1928 at \$226,259,000. The slump in 1929, which brought to an end this period of building activity, is clearly depicted by the figures on families provided for in 1929. The 257 cities used by the Bureau of Labor Statistics provided for only 244,197 families in 1929, a figure which is lower than any included in the period studied except that of 1921, and which marks a decrease of 144,481 from the 1928 total and a decrease of 247,025 from the maximum of 1925. In passing, the fact is worthy of attention that the apartment-house percentage declined only slightly under these conditions. For 1929, 48.6% of the families provided for in the 257 cities were in multi-family buildings.⁴

These facts suggest that for the eight years being studied residential construction was not impeded or unduly re-

² Bureau of Labor Statistics, *Bulletin* No. 318, p. 9.

³ *Survey of Current Business*, p. 65 (February, 1930), data from F. W. Dodge Corporation.

⁴ 30 *Monthly Labor Review* 158-168 (June, 1930).

stricted by unusual economic forces. The needs for housing of the various classes of our urban population were being filled as far as commercial builders operating under generally favorable conditions could fill them. The amount of building done by non-commercial organizations was negligible. If the single-family house declined rapidly during the period, the explanation would seem to lie either in a change in the demand for houses or in certain economic conditions *within* the various industries and businesses which produce houses. No group of industries, of course, is separated from the general fabric of economic organization and the distribution of wealth which it entails but these eight years seem to be a particularly fair trial period for the residential construction industries.

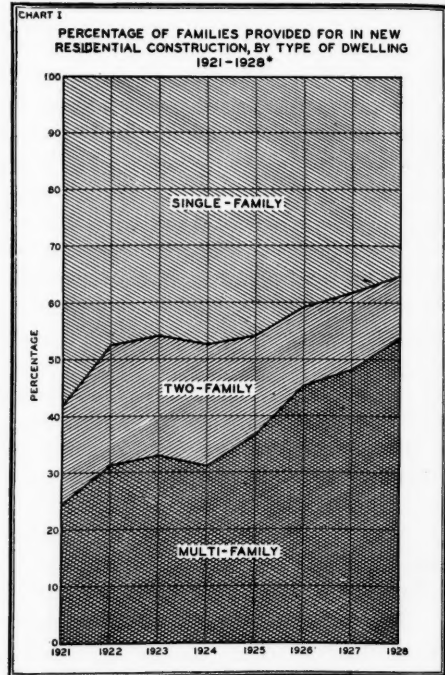
TABLE I. FAMILIES PROVIDED FOR BY NEW RESIDENTIAL CONSTRUCTION IN SINGLE-FAMILY, TWO-FAMILY AND MULTI-FAMILY DWELLINGS IN 255 CITIES IN THE UNITED STATES, 1921-1928.

Year (a)	Single Family		Duplex		Multi-Family		Total (h)
	Number (b)	Percentage (c)	Number (d)	Percentage (e)	Number (f)	Percentage (g)	
1921.....	130,729	58.23	38,947	17.35	54,829	24.42	224,505
1922.....	178,397	47.43	80,193	21.32	117,547	31.25	376,137
1923.....	207,631	45.78	96,398	21.25	149,505	32.97	453,534
1924.....	209,548	47.44	94,703	21.44	137,460	31.12	441,711
1925.....	225,199	45.88	86,068	17.54	179,516	36.58	490,783
1926.....	188,093	40.71	64,623	13.99	209,337	45.30	462,053
1927.....	155,572	38.30	54,951	13.53	195,660	48.17	406,183
1928.....	136,890	35.19	43,057	11.07	209,043	53.74	388,990

The Trend toward Apartments

Table I and Chart I show the shift toward apartment-house construction in the period from 1921 to 1928. It should be noted that the unit used is *families provided for* in new residential construction for which permits were issued. The number of cities now reporting has been reduced to those which have given information for each of the eight years. These data for 255 cities are the material on which all other tables

in this article are based, although most of the others are summary or derivative tables. The cities range in size from approximately 25,000 to the millions of



New York and are well distributed throughout the various sections of the country. The most prominent facts of Table I are the increase in the proportion of families provided for in apartments from 24.4% to 53.7% of the yearly total of new construction and the correspondingly rapid decrease of families provided for in single-family and two-family houses.

Two sources of minor inaccuracies in such figures are apparent. The issuance of a building permit is no guarantee that the structure for which the permit was issued will be constructed or, if constructed, that it will be built in the year in which the permit was given. However, in times of fairly brisk construc-

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TABLE II. INCREASE IN PERCENTAGE OF TOTAL FAMILIES PROVIDED FOR IN NEW MULTI-FAMILY DWELLINGS, BY SECTIONS OF THE UNITED STATES, 1921-1928.

Section (a)	Number of Cities (b)	Percentage of Families Provided for in Multi-Family Dwellings		Increase in Percentage 1921-1928 (e)	Rank in Percentage of Urbani- zation 1920 (f)	Rank in Urban Home Ownership 1920 (g)
		1921 (c)	1928 (d)			
Middle Atlantic.....	53	35.31 %	70.51 %	35.20	2	9
Pacific.....	15	20.26	51.16	30.90	3	4
East North Central.....	68	24.60	47.48	22.88	4	2
South Atlantic.....	27	14.00	35.90	21.90	7	6
New England.....	43	23.10	43.21	20.11	1	8
West North Central.....	19	19.70	39.56	19.86	5	1
Mountain.....	7	8.63	25.84	17.21	6	3
East South Central.....	11	10.61	26.69	16.08	9	7
West South Central.....	12	8.76	17.89	9.13	8	5

tion, such as the period dealt with, the percentage of buildings not erected after a permit is issued is probably small and the separation of permit and construction in different years is assumed to be about the same from year to year. Another and more serious defect is the absence of reliable information on vacancies in the different types of buildings. Without such vacancy reports the difficulty arises of saying whether the permits issued show a change in housing or a mere misunderstanding of the market by the builders and financiers of the dwellings. Of course, it may be assumed that the latter case would be corrected in the course of time and permits issued would fall off in those classes of homes which previously were overbuilt. This seems a reasonable assumption but the fact remains that the very lack of accurate information on vacancies which handicaps this study lengthens the period before the reaction to overbuilding (or underbuilding for that matter) of any type of structure takes place.

The multi-family increase shown in Table I has not been confined to one or two sections of the country. Table II

shows a significant increase in apartments in every section of the United States. For comparison, columns (f) and (g) give the rank of the sections in 1920 in percentage of total population in cities, i. e., in municipalities of 2,500 population and over, and in ownership of homes not on farms.⁵ Study of the table reveals that not only is the multi-family increase exceptionally widespread but it has been strong even in sections which previous to 1920 had relatively few apartments, at least in so far as high urban home-ownership percentages indicate a prevalence of single-family houses. This comparison is open to some question because the ownership figures are for all homes not on farms, while the apartment-trend data are for cities of 25,000 and over. The comparison by rank, however, shows only relative position and is based on the only accurate data available for use as an index of the prevalence of apartments before 1921.

Three Possible Explanations

Once the facts are clear that the multi-family trend is not centered in one or two sections of the country and that it appears to be strong in some sections which previously had relatively few

⁵H. B. Dorau and A. G. Hinman, *Urban Land Economics* (New York: Macmillan & Co., 1928), pp. 88 and 401.

apartments, three possible explanations readily present themselves.

First, this movement may be a reaction to the general housing shortage of the war and immediate post-war years. In overcoming that shortage, so runs this line of argument, apartment houses have been erected because they are the quickest means of housing large numbers of people. They usually are built in sections already improved and partially built up and hence do not have to wait for subdivision, street improvement installation, and the extension of transit facilities. The construction cost per family is low, a further aid in making up a general shortage of dwellings.

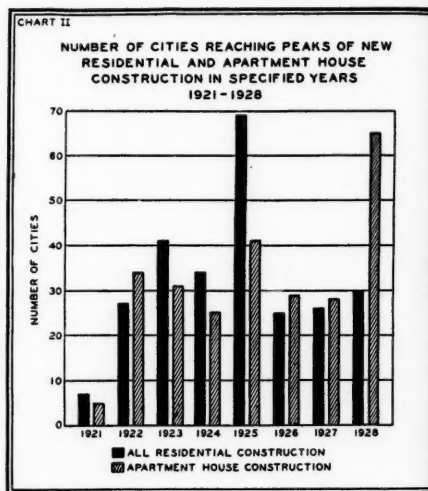
The second suggested influence is the rate of population growth of the cities. As large numbers of people are added to a city's population in a short space of time, apartments are quickly and easily built to accommodate them. Moreover, most of the newcomers will prefer rented apartments until such time as they can become established in their business, jobs, and professions. If this is a major influence, the most rapidly growing cities will show the largest increase in apartment-house percentages.

Finally, mere size of population may be the controlling force. Superficially, this seems a highly probable explanation. For some time the existence of densely built apartment districts has commonly been looked on as one of the distinguishing marks of large cities.

The Housing Shortage Explanation

The three suggestions or hypotheses just stated will be examined in order. The first one, that the multi-family movement is the response to the general housing shortage, seems doubtful after consideration of certain items in Table I. Column (h), the total number of families provided for by all types of

residential construction, shows that the maximum accommodations were built in 1925 and that the following three years saw a rapid decline in the yearly total of families provided for, which amounted in 1928 to over 100,000 families. But the multi-family percentage in column (g) shows a quite different change. From 1921 through 1925 the apartment percentage rose 12.16% of the yearly total; from 1925 to 1928, the period during which the total



housing production fell off—presumably, therefore, a period in which the general housing shortage had been allayed—the multi-family percentage increased by 17.16% of the total. Despite the decline of residential building during this three-year period, 1928 showed the second largest apartment-house construction of the entire eight years, less than 300 families behind the high mark of 1926. An interesting fact is that the apartment-house increase from 1925 to 1928 took place not only at the expense of single-family houses but also of the two-family buildings, which prior to 1925 had held their relative position.

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The unsatisfactoriness of this hypothesis is intensified by the data of Chart II, showing the number of cities which each year had the largest residential construction figures and those which had the largest multi-family construction. These maxima of total and apartment construction are measured in absolute terms, the number of families provided for. In 1925, 69 cities reached their maximum of total residential construction, while only 41 were at their highest peak in the building of apartment-house units. A fact not shown on the chart is that in only 27 cities did the maxima of both series fall in 1925. In 1928, on the other hand, only 30 cities experienced their highest totals of residential construction of all classes while 65 reached new heights in apartment-house building measured in families provided for. Here, again, the number of cities having both maxima in the same year is relatively low; the figure, 24, is slightly less than in 1925. The evidence seems quite clear, in spite of the short period covered that, while from 1921 to 1925 the multi-family construction seemed to follow the amount of residential construction of all kinds, an unmistakably sharp divergence has occurred since 1925. Therefore, the assumption that the multi-family movement is an attempt to overcome a general housing shortage is not justified.

* The figures on rate of growth were drawn from the 1920 Census and the 1927 estimates of the Bureau of the Census and are expressed as percentages of the 1920 figure for each city. The 1920 populations rather than those of 1921 were used as the starting point for the obvious reason of their greater accuracy. The 1927 estimates were used instead of those for 1928 for two reasons. After 1927 the Bureau of the Census does not estimate the population of cities with less than 30,000 population. This meant a considerable reduction in the number of cities in this study which could be used in the classification. This policy which was followed in the preceding decade implies, moreover, a recognition of the growing chances of error as the period from the census count lengthens. It seemed better to have a larger

Multi-Family Trend and Rapidity of City Growth

The second suggestion which relates the multi-family movement to rapidity of growth of cities is equally erroneous. The quartile groupings of cities by rate of growth⁶ (Table III) discloses that the most rapidly growing cities have increased in apartment-house building very slowly—7.52% of the yearly total over the eight years—while the slowest growing cities have experienced an increase in multi-family percentage of 34.18%. The data shown in this table are exactly opposite to the results expected from such a classification according to the second hypothesis. While the data are not sufficient in themselves to justify the stating of an opposite theory, namely, that the multi-family movement varies inversely with the rate of growth of cities, they are fatal to our second hypothesis.

Table IV, which applies both to the testing of this hypothesis and the following one, substantiates the conclusion already drawn. Each of the size groupings of cities was broken up into quartile groups on the basis of rate of growth. The population groups 4, 5, and 6 contain a sufficient number of cities to make sure that the quartile averages are not determined by one or two extreme cities. Population groups 1, 2, and 3, although very small, are equally clear

group of cities estimated to 1927 than to decrease the number of cities and force those used into the range of growing error in estimation.

The total number of cities in the groupings by rate of growth is 209. Forty-six of the 255 cities did not have 1927 figures because the Bureau of Census believed that in the light of all available information this method of estimating intra-censal population gave improbable totals in these cases.

Mr. W. M. Stewart, Director of the Bureau of the Census and other officials of the Bureau have helped materially by checking estimates and by making careful explanation of the methods used and the reasons for the omissions.

TABLE III. INCREASE IN PERCENTAGE OF TOTAL FAMILIES PROVIDED FOR IN MULTI-FAMILY DWELLINGS, BY RATE OF GROWTH OF CITIES, 1921-1928.

Classes of Cities by Rates of Growth 1920-1927	Number of Cities	Percentage of Families Provided for in Multi-Family Dwellings		Increase in Multi-Family Percentage 1921-1928
		1921	1928	
Quartile Group 1, rate .1% to 10.4%.....	52	36.09%	70.27%	34.18
Quartile Group 2, rate 10.5% to 17.7%.....	53	23.67	53.47	29.80
Quartile Group 3, rate 17.8% to 25.7%.....	52	17.41	45.25	27.84
Quartile Group 4, rate 25.8% to 108.1%.....	52	19.85	27.37	7.52

in disclosing that the rate of growth is not an effective influence on the apartment house trend. The most surprising fact is that only two quartile groupings showed decreases in apartment-house percentages over the eight-year period and both of these included very rapidly growing cities.

The merit of the quartile groupings in Table IV is that the relative uniformity of size of population guards against the error of one or two large cities influencing unduly the averages of the quartile groups in which they happen to fall. Table III lacks this virtue but has the advantage of large numbers of cities in each grouping. Both methods of classification, however, yield results obviously contrary to the hypothesis under consideration and the statement seems safe that rate of growth of cities is not a force which affects substantially the multi-family housing trend.

Multi-Family Trend and Size of City

The third hypothesis is the one which probably is most commonly put forward to explain the apartment-house increase. In the minds of most persons large cities are connected with apartments. From this impression follows the inference that the apartment-house increase of the post-war period is a phenomenon of large cities and that the larger the cities the stronger is apartment growth. The major divisions of Table IV present the data to test this line of reasoning.

The increases of multi-family percentages do not run as clearly counter to the expectations as they did in Table III but, on the other hand, they can scarcely be said to support the hypothesis. The smallest increase, 10% of the yearly total, was made in the next to the smallest size group. The smallest group, however, (despite a decline in the apartment percentage of 6.25 from 1927 to 1928) had practically the same multi-family increase as the 100,000-250,000 group and was only 3.37 behind the percentage increase of the 500,000-1,000,000, class. Rather large increases were found in three cities over a million and the class of 250,000 to 500,000 population. Basing the classification of population on population within municipal limits as reported by the Census of 1920, the third hypothesis of the apartment trend is also impaired, though not as clearly unjustified as the rate-of-growth explanation.

Although the classification made in Table IV discloses the insufficiency of the third hypothesis, the use of urban population figures suggests another classification which is presented in Table V. As the population of a country becomes more urbanized, a fact of common observation is the clustering or grouping of cities in metropolitan areas, the "con-urbation" in Geddes' writings. The Census of 1920 recognized that for many economic and social purposes cities in such a group could not be

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treated as self-contained units. A definition of a metropolitan area was set up and 29 such districts were recognized. This definition was in many respects unsatisfactory and a substitute, which is more elastic and also more difficult to apply, is being used in compilations of the 1930 data. The 1920 classification of metropolitan districts was used to separate the 255 cities into the groups shown in Table V. The group entitled

"central metropolitan" includes the chief cities, the "nuclei" of the metropolitan districts;⁷ those marked "suburban" include all cities within metropolitan limits other than central cities; and all other cities were called "independent."

This classification shows a clear tendency; the multi-family movement thus

⁷The 29 metropolitan districts had 31 central metropolises; Kansas City, Kansas, and Kansas City, Missouri; and St. Paul and Minneapolis were counted as centers of two metropolitan areas.

TABLE IV. INCREASE IN PERCENTAGE OF TOTAL FAMILIES PROVIDED FOR IN MULTI-FAMILY DWELLINGS, BY POPULATION AND RATE OF GROWTH OF CITIES, 1921-1928.

No.	Classes of Cities by Population (1920) and Rate of Growth 1920-1927	Number of Cities	Percentage of Families Provided for in New Multi-Family Dwellings		Increase in Multi-Family Percentage 1921-1928
			1921	1928	
1.	Cities of 1,000,000 and over.....	3	42.91%	76.56%	33.65
	New York City, rate 5.1%.....	1	44.22	80.40	36.18
	Philadelphia, rate 11.6%.....	1	6.73	23.40	16.67
	Chicago, rate 14.8%.....	1	44.56	80.70	36.14
2.	Cities 500,000 to 1,000,000.....	9	22.56	46.79	24.23
	Quartile Group 1, rate 6.0% to 8.5%.....	2*	14.74	53.22	38.48
	Quartile Group 2, rate 8.6% to 12.3%.....	2	30.20	45.22	15.02
	Quartile Group 3, rate 12.4% to 17.8%.....	2	34.92	49.05	14.13
	Quartile Group 4, rate 17.9% to 34.3%.....	2	30.67	29.99	— .68
3.	Cities 250,000 to 500,000.....	13	17.68	50.16	32.48
	Quartile Group 1, rate 2.7% to 9.6%.....	3	17.98	43.24	25.26
	Quartile Group 2, rate 9.7% to 15.0%.....	3	16.26	61.62	45.36
	Quartile Group 3, rate 15.1% to 18.5%.....	3	21.27	49.16	27.89
	Quartile Group 4, rate 18.6% to 23.4%.....	3	19.38	53.23	33.85
4.	Cities 100,000 to 250,000.....	42	12.78	33.70	20.92
	Quartile Group 1, rate 4.3% to 12.3%.....	9	15.61	29.49	13.88
	Quartile Group 2, rate 12.4% to 16.1%.....	10	13.89	33.54	19.65
	Quartile Group 3, rate 16.2% to 23.2%.....	9	11.40	46.64	35.24
	Quartile Group 4, rate 23.3% to 54.8%.....	9	12.73	32.40	19.67
5.	Cities 50,000 to 100,000.....	72	16.53	26.53	10.00
	Quartile Group 1, rate 0.3% to 10.4%.....	16	7.35	19.80	12.45
	Quartile Group 2, rate 10.5% to 18.6%.....	16	9.20	17.74	8.54
	Quartile Group 3, rate 18.7% to 26.5%.....	15	13.92	41.43	27.51
	Quartile Group 4, rate 26.6% to 108.1%.....	16	24.58	23.57	— 1.01
6.	Cities 25,000 to 50,000.....	116	11.13	31.99	20.86
	Quartile Group 1, rate 0.1% to 11.1%.....	22	6.41	28.63	22.22
	Quartile Group 2, rate 11.2% to 19.3%.....	21	5.80	20.38	14.58
	Quartile Group 3, rate 19.4% to 28.0%.....	22	16.45	31.58	15.13
	Quartile Group 4, rate 28.1% to 92.9%.....	21	10.23	36.97	26.74

* Rate-of-growth estimates not available for all cities.

stricted by unusual economic forces. The needs for housing of the various classes of our urban population were being filled as far as commercial builders operating under generally favorable conditions could fill them. The amount of building done by non-commercial organizations was negligible. If the single-family house declined rapidly during the period, the explanation would seem to lie either in a change in the demand for houses or in certain economic conditions *within* the various industries and businesses which produce houses. No group of industries, of course, is separated from the general fabric of economic organization and the distribution of wealth which it entails but these eight years seem to be a particularly fair trial period for the residential construction industries.

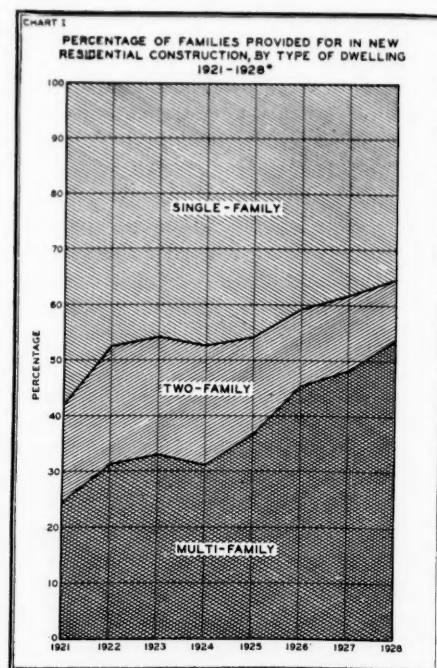
TABLE I. FAMILIES PROVIDED FOR BY NEW RESIDENTIAL CONSTRUCTION IN SINGLE-FAMILY, TWO-FAMILY AND MULTI-FAMILY DWELLINGS IN 255 CITIES IN THE UNITED STATES, 1921-1928.

Year (a)	Single Family		Duplex		Multi-Family		Total (h)
	Number (b)	Percentage (c)	Number (d)	Percentage (e)	Number (f)	Percentage (g)	
1921.....	130,729	58.23	38,947	17.35	54,829	24.42	224,505
1922.....	178,397	47.43	80,193	21.32	117,547	31.25	376,137
1923.....	207,631	45.78	96,398	21.25	149,505	32.97	453,534
1924.....	209,548	47.44	94,703	21.44	137,460	31.12	441,711
1925.....	225,199	45.88	86,068	17.54	179,516	36.58	490,783
1926.....	188,093	40.71	64,623	13.99	209,337	45.30	462,053
1927.....	155,572	38.30	54,951	13.53	195,660	48.17	406,183
1928.....	136,890	35.19	43,057	11.07	209,043	53.74	388,990

The Trend toward Apartments

Table I and Chart I show the shift toward apartment-house construction in the period from 1921 to 1928. It should be noted that the unit used is *families provided for* in new residential construction for which permits were issued. The number of cities now reporting has been reduced to those which have given information for each of the eight years. These data for 255 cities are the material on which all other tables

in this article are based, although most of the others are summary or derivative tables. The cities range in size from approximately 25,000 to the millions of



New York and are well distributed throughout the various sections of the country. The most prominent facts of Table I are the increase in the proportion of families provided for in apartments from 24.4% to 53.7% of the yearly total of new construction and the correspondingly rapid decrease of families provided for in single-family and two-family houses.

Two sources of minor inaccuracies in such figures are apparent. The issuance of a building permit is no guarantee that the structure for which the permit was issued will be constructed or, if constructed, that it will be built in the year in which the permit was given. However, in times of fairly brisk construc-

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TABLE II. INCREASE IN PERCENTAGE OF TOTAL FAMILIES PROVIDED FOR IN NEW MULTI-FAMILY DWELLINGS, BY SECTIONS OF THE UNITED STATES, 1921-1928.

Section (a)	Number of Cities (b)	Percentage of Families Provided for in Multi-Family Dwellings		Increase in Percentage (e)	Rank in Percentage of Urbani- zation (f)	Rank in Urban Home Ownership (g)
		1921 (c)	1928 (d)			
Middle Atlantic.....	53	35.31 %	70.51 %	35.20	2	9
Pacific.....	15	20.26	51.16	30.90	3	4
East North Central.....	68	24.60	47.48	22.88	4	2
South Atlantic.....	27	14.00	35.90	21.90	7	6
New England.....	43	23.10	43.21	20.11	1	8
West North Central.....	19	19.70	39.56	19.86	5	1
Mountain.....	7	8.63	25.84	17.21	6	3
East South Central.....	11	10.61	26.69	16.08	9	7
West South Central.....	12	8.76	17.89	9.13	8	5

tion, such as the period dealt with, the percentage of buildings not erected after a permit is issued is probably small and the separation of permit and construction in different years is assumed to be about the same from year to year. Another and more serious defect is the absence of reliable information on vacancies in the different types of buildings. Without such vacancy reports the difficulty arises of saying whether the permits issued show a change in housing or a mere misunderstanding of the market by the builders and financiers of the dwellings. Of course, it may be assumed that the latter case would be corrected in the course of time and permits issued would fall off in those classes of homes which previously were overbuilt. This seems a reasonable assumption but the fact remains that the very lack of accurate information on vacancies which handicaps this study lengthens the period before the reaction to overbuilding (or underbuilding for that matter) of any type of structure takes place.

The multi-family increase shown in Table I has not been confined to one or two sections of the country. Table II

shows a significant increase in apartments in every section of the United States. For comparison, columns (f) and (g) give the rank of the sections in 1920 in percentage of total population in cities, i. e., in municipalities of 2,500 population and over, and in ownership of homes not on farms.⁵ Study of the table reveals that not only is the multi-family increase exceptionally widespread but it has been strong even in sections which previous to 1920 had relatively few apartments, at least in so far as high urban home-ownership percentages indicate a prevalence of single-family houses. This comparison is open to some question because the ownership figures are for all homes not on farms, while the apartment-trend data are for cities of 25,000 and over. The comparison by rank, however, shows only relative position and is based on the only accurate data available for use as an index of the prevalence of apartments before 1921.

Three Possible Explanations

Once the facts are clear that the multi-family trend is not centered in one or two sections of the country and that it appears to be strong in some sections which previously had relatively few

⁵ H. B. Dorau and A. G. Hinman, *Urban Land Economics* (New York: Macmillan & Co., 1928), pp. 88 and 401.

apartments, three possible explanations readily present themselves.

First, this movement may be a reaction to the general housing shortage of the war and immediate post-war years. In overcoming that shortage, so runs this line of argument, apartment houses have been erected because they are the quickest means of housing large numbers of people. They usually are built in sections already improved and partially built up and hence do not have to wait for subdivision, street improvement installation, and the extension of transit facilities. The construction cost per family is low, a further aid in making up a general shortage of dwellings.

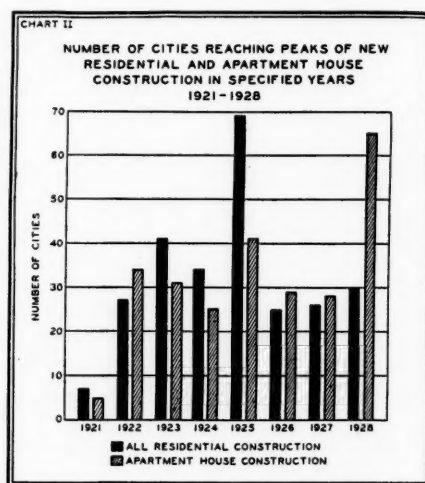
The second suggested influence is the rate of population growth of the cities. As large numbers of people are added to a city's population in a short space of time, apartments are quickly and easily built to accommodate them. Moreover, most of the newcomers will prefer rented apartments until such time as they can become established in their business, jobs, and professions. If this is a major influence, the most rapidly growing cities will show the largest increase in apartment-house percentages.

Finally, mere size of population may be the controlling force. Superficially, this seems a highly probable explanation. For some time the existence of densely built apartment districts has commonly been looked on as one of the distinguishing marks of large cities.

The Housing Shortage Explanation

The three suggestions or hypotheses just stated will be examined in order. The first one, that the multi-family movement is the response to the general housing shortage, seems doubtful after consideration of certain items in Table I. Column (h), the total number of families provided for by all types of

residential construction, shows that the maximum accommodations were built in 1925 and that the following three years saw a rapid decline in the yearly total of families provided for, which amounted in 1928 to over 100,000 families. But the multi-family percentage in column (g) shows a quite different change. From 1921 through 1925 the apartment percentage rose 12.16% of the yearly total; from 1925 to 1928, the period during which the total



housing production fell off—presumably, therefore, a period in which the general housing shortage had been allayed—the multi-family percentage increased by 17.16% of the total. Despite the decline of residential building during this three-year period, 1928 showed the second largest apartment-house construction of the entire eight years, less than 300 families behind the high mark of 1926. An interesting fact is that the apartment-house increase from 1925 to 1928 took place not only at the expense of single-family houses but also of the two-family buildings, which prior to 1925 had held their relative position.

The unsatisfactoriness of this hypothesis is intensified by the data of Chart II, showing the number of cities which each year had the largest residential construction figures and those which had the largest multi-family construction. These maxima of total and apartment construction are measured in absolute terms, the number of families provided for. In 1925, 69 cities reached their maximum of total residential construction, while only 41 were at their highest peak in the building of apartment-house units. A fact not shown on the chart is that in only 27 cities did the maxima of both series fall in 1925. In 1928, on the other hand, only 30 cities experienced their highest totals of residential construction of all classes while 65 reached new heights in apartment-house building measured in families provided for. Here, again, the number of cities having both maxima in the same year is relatively low; the figure, 24, is slightly less than in 1925. The evidence seems quite clear, in spite of the short period covered that, while from 1921 to 1925 the multi-family construction seemed to follow the amount of residential construction of all kinds, an unmistakably sharp divergence has occurred since 1925. Therefore, the assumption that the multi-family movement is an attempt to overcome a general housing shortage is not justified.

* The figures on rate of growth were drawn from the 1920 Census and the 1927 estimates of the Bureau of the Census and are expressed as percentages of the 1920 figure for each city. The 1920 populations rather than those of 1921 were used as the starting point for the obvious reason of their greater accuracy. The 1927 estimates were used instead of those for 1928 for two reasons. After 1927 the Bureau of the Census does not estimate the population of cities with less than 30,000 population. This meant a considerable reduction in the number of cities in this study which could be used in the classification. This policy which was followed in the preceding decade implies, moreover, a recognition of the growing chances of error as the period from the census count lengthens. It seemed better to have a larger

Multi-Family Trend and Rapidity of City Growth

The second suggestion which relates the multi-family movement to rapidity of growth of cities is equally erroneous. The quartile groupings of cities by rate of growth⁶ (Table III) discloses that the most rapidly growing cities have increased in apartment-house building very slowly—7.52% of the yearly total over the eight years—while the slowest growing cities have experienced an increase in multi-family percentage of 34.18%. The data shown in this table are exactly opposite to the results expected from such a classification according to the second hypothesis. While the data are not sufficient in themselves to justify the stating of an opposite theory, namely, that the multi-family movement varies inversely with the rate of growth of cities, they are fatal to our second hypothesis.

Table IV, which applies both to the testing of this hypothesis and the following one, substantiates the conclusion already drawn. Each of the size groupings of cities was broken up into quartile groups on the basis of rate of growth. The population groups 4, 5, and 6 contain a sufficient number of cities to make sure that the quartile averages are not determined by one or two extreme cities. Population groups 1, 2, and 3, although very small, are equally clear

group of cities estimated to 1927 than to decrease the number of cities and force those used into the range of growing error in estimation.

The total number of cities in the groupings by rate of growth is 209. Forty-six of the 255 cities did not have 1927 figures because the Bureau of Census believed that in the light of all available information this method of estimating intra-censal population gave improbable totals in these cases.

Mr. W. M. Steuart, Director of the Bureau of the Census and other officials of the Bureau have helped materially by checking estimates and by making careful explanation of the methods used and the reasons for the omissions.

TABLE III. INCREASE IN PERCENTAGE OF TOTAL FAMILIES PROVIDED FOR IN MULTI-FAMILY DWELLINGS, BY RATE OF GROWTH OF CITIES, 1921-1928.

Classes of Cities by Rates of Growth 1920-1927	Number of Cities	Percentage of Families Provided for in Multi-Family Dwellings		Increase in Multi-Family Percentage 1921-1928
		1921	1928	
Quartile Group 1, rate .1% to 10.4%.....	52	36.09%	70.27%	34.18
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2.	Cities 500,000 to 1,000,000.....	9	22.56	46.79	24.23
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3.	Cities 250,000 to 500,000.....	13	17.68	50.16	32.48
	Quartile Group 1, rate 2.7% to 9.6%.....	3	17.98	43.24	25.26
	Quartile Group 2, rate 9.7% to 15.0%.....	3	16.26	61.62	45.36
	Quartile Group 3, rate 15.1% to 18.5%.....	3	21.27	49.16	27.89
	Quartile Group 4, rate 18.6% to 23.4%.....	3	19.38	53.23	33.85
4.	Cities 100,000 to 250,000.....	42	12.78	33.70	20.92
	Quartile Group 1, rate 4.3% to 12.3%.....	9	15.61	29.49	13.88
	Quartile Group 2, rate 12.4% to 16.1%.....	10	13.89	33.54	19.65
	Quartile Group 3, rate 16.2% to 23.2%.....	9	11.40	46.64	35.24
	Quartile Group 4, rate 23.3% to 54.8%.....	9	12.73	32.40	19.67
5.	Cities 50,000 to 100,000.....	72	16.53	26.53	10.00
	Quartile Group 1, rate 0.3% to 10.4%.....	16	7.35	19.80	12.45
	Quartile Group 2, rate 10.5% to 18.6%.....	16	9.20	17.74	8.54
	Quartile Group 3, rate 18.7% to 26.5%.....	15	13.92	41.43	27.51
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	Quartile Group 3, rate 19.4% to 28.0%.....	22	16.45	31.58	15.13
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* Rate-of-growth estimates not available for all cities.

TABLE V. INCREASE OF THE PERCENTAGE OF TOTAL FAMILIES PROVIDED FOR IN NEW MULTI-FAMILY DWELLINGS BY TYPE OF CITY, 1921-1928.

Type of City	No. of Cities	Percentage of Families Provided for in Multi-Family Dwellings		Increase in Multi-Family Percentage 1921-1928
		1921	1928	
Central metropolitan.....	31	30.34%	62.59%	32.25
Suburban.....	55	25.68	58.33	32.65
Independent.....	169	10.12	17.84	7.72

far is largely restricted to the metropolitan districts. The single-family house, however, has not fared quite so well in the independent cities as the table indicates. Whereas two-family houses have declined rapidly in most classes during the last three or four years, in these independent cities the two-family percentage has risen by 3.88% over the eight-year period. In other words, although apartments increased only 7.72% of the yearly total of residential construction, single-family houses declined in importance by 11.56% of the total.

To many persons the facts of Table V will be decidedly disturbing. The suburbs which have been looked upon as the retreat of those who are financially able to seek home-ownership and less congested surroundings, have felt the change toward apartment living in almost the same degree as the central cities, all of which had in 1920 over 200,000 population. The suburban cities included, it must be remembered, are all over 25,000 population,⁸ so the change has not been quite as startling as it at first seems but the spread of the apartment to the suburbs is disclosed in a degree which cannot be gainsaid. One of the most salutary of the applications of the facts found in this study would be a realization on the part of the great majority of the middle- and upper-middle

⁸ The median population of the suburban group was 43,496; the arithmetic mean was 65,079.

income classes that they cannot keep on indefinitely running away from apartments. A choice will have to be made, sooner or later, by the larger part of the well-to-do classes among acceptance of this type of living, modification of it to meet higher standards, or changing the forces behind it and associated with it. The sooner the issue is faced and the decision made the more satisfactory will be the residential districts of all large cities at the end of another generation.

Summary

This section of the study has dealt only with the more obvious classifications and treatment of the data. The conclusions reached, however, can be quite definitely stated. The shift toward apartment-house living in American cities went forward rapidly during the period of active building from 1921 to 1928. The movement, as measured by permits issued for residential buildings, was not confined to one or two sections of the United States but was felt in all districts of the country. It cannot be explained as a concomitant of the recovery from the general housing shortage of the war and immediate post-war years, nor can it be dismissed as a phenomenon characterizing solely the larger and more rapidly growing cities. The increase of multi-family construction, however, has been much more rapid in metropolitan districts than in independent, separate cities. Within the metropolitan areas the larger suburban towns have experienced as rapid a change as have the central cities themselves.

These classifications, however, do not give all the detail required in a study of so fundamental a change. A second section of this article will attempt to go farther into the classification and analysis of the movement.

LEGAL VERSUS ECONOMIC PRINCIPLES IN UTILITY VALUATION*

By D. F. PEGRUM

The economic aspects of utility valuation, as opposed to the purely legal phases, are emphasized when due consideration is given to the influence of price fluctuations. The discussion in the first installment, which considered the relation of price changes to the determination of the rate-base and to the rates to be charged for service, will be continued here with an analysis of regulation from the point of view of economic theory.

III. Regulation and Economic Theory

If regulation is to be successful, it must be based on sound economic theory. A policy designed to meet the tests of time and experience cannot be built upon premises which run counter to, or ignore, principles inherent in our economic life. One of the chief difficulties besetting programs of social control is failure to take account of existing conditions in the formulation of policies; another is the perennial propensity to theorize as to what *ought* to be, a philosophical ideal, and then to believe that the ideal actually exists in fact. Theories and policies of regulation must be tested from both scientific and practical points of view and be modified when they are found wanting. Consequently, a brief examination of some of the economic

concepts upon which our present methods of control are predicated is pertinent. Very little systematic study has been given to the question from this approach. Practically the whole controversy has raged around the problem of the "rate-base," while the question of use of a rate-base in setting the actual rates to be charged has been left to go by the boards.²⁷

The courts and commissions have continually asserted that the principles of price and valuation applicable to competitive industry cannot be used for purposes of regulation. Consequently they have adopted the legal fiction of "value for rate-making" which is not a valuation at all, but merely an engineering appraisal rather sadly distorted by legal arguments. As if this were not bad enough, however, the authorities have then proceeded on the theory that competitive prices in a dynamic society are determined by cost of production and therefore monopoly prices should be fixed in the same way. Let us now examine some of these premises.

Underlying the whole problem and use of the rate-base method is a concept of value. The courts have endeavored to determine the "fair-value" of property devoted to public use since the

*See 6 *Journal of Land & Public Utility Economics*, 127-135 (May, 1930) for the first installment of this article.

²⁷ Two articles have come to the writer's notice in which the authors have taken the stand that the problem of determining the rate-base is not only non-essential to the determination of reasonable rates, but is actually the wrong approach. See A. T. Hadley, "The Meaning of Valuation," 18 *Paper and Proceedings*

of American Economic Association 173 (1928), and J. H. Bickley, "A Fair Return for Public Utilities," 3 *Journal of Land & Public Utility Economics* 61-70 (February, 1927). The same line of argument is implied in H. D. Dozier, "Reasonable Rate of Return in Public Utility Cases," 3 *Journal of Land & Public Utility Economics* 71-76 (February 1927), and "Present Reasonable Rate of Return of Public Utilities," 4 *Ibid.* 235-242 (August, 1928).

case of *Smyth v. Ames*. Moreover, they have interpreted this phrase to mean "present value."²⁸ To this they have added the idea that value varies according to the purpose for which the estimate is used. Apparently they believe that the "value" of property under regulation is inherent in the property itself regardless of the income which it produces. This is the escape from the vicious circle!

As a result of this line of thought, the controversy has raged around the value of property when devoted to public purposes. Economists will recognize at once that the term "value" as used by the judiciary is a misnomer. It is not value at all, but merely an arbitrary appraisal based on hypothetical cost estimates. The value of property can be *fixed* only by determining earnings.²⁹

As a matter of fact, the ideas of value as employed in regulation today are juristic and ethical, not economic. There may be a place for such concepts but unfortunately they have been taken over by our commissions to solve an economic problem. Under our constitution the courts may regard it as their duty to set a minimum in rate-making which determines confiscation, but this should not be taken as fixing the actual return to be allowed. At this point courts and commissions come to the parting of the ways. From then on the administrative bodies should consider economic factors, paying attention to court mandates only when they are in danger of running foul of the law. *Value* of the property under such circumstances has little to do with rates which are adequate from the economic standpoint.

²⁸ *Willcox v. Consolidated Gas Co.*, *supra*, n. 19; *State ex rel Southwestern Bell Telephone Co. v. Public Service Commission of Missouri*, *supra*, n. 3.

²⁹ See Hadley, *op. cit.*; see also Gerard C. Henderson, "Railway Valuation and the Courts," 33 *Harvard Law Review* 902, 1031 (May, 1920).

When property is purchased, the value is of significance to the commissions, but from then on the value is dependent upon income, and thus becomes a consequence of the rates prescribed. These in turn depend upon the costs of producing the service, plus the income necessary to maintain the credit of the corporation.

All the objections which have so far been advanced against the present theory and method of regulation can be met, its supporters contend, by a mere variation of the rate of return, *once the rate-base has been decided upon*. Indeed, the definition given for a fair return seems to lend validity to this argument. For example, in *Willcox v. Consolidated Gas Co.*, the Court said:

"There is no particular rate of compensation which must in all cases and in all parts of the country be regarded as sufficient for capital invested in business enterprises. Such compensation must depend greatly upon circumstances and locality. Among other things the amount of risk in the business is a most important factor as well as the locality where the business is conducted and the rate expected and usually realized there upon investments of a somewhat similar nature with regard to the risk attending them."³⁰

Application of this theory, however, is somewhat different from what one might expect, thanks to the emphasis on the rate-base, on the one hand; and the neglect of financial structures, and the way in which the net earnings are applied by public utilities in compensating their investors,³¹ on the other.

³⁰ *Supra* n. 19. See also *Bluefield Waterworks and Improvement Company v. Public Service Commission of the State of West Virginia*, 262 U. S. 679 (1923). For a similar definition by the California Railroad Commission, see *Palo Alto v. Palo Alto Gas Co.*, 2 Cal. R. C. R. 300.

³¹ See J. H. Cohen, "Confiscatory Rates and Modern Finance," 39 *Yale Law Journal* 151 (December, 1929) for a discussion of financial structures and the problem of a fair return.

Actually the control of securities has been given serious consideration only in recent years, and even now this question is considered to be of decidedly subordinate importance to that of a "fair return on a fair value." The theory seems to be that income is an issue to be dealt with quite distinct from that of finance, in spite of the fact that capital for public utilities must come through the medium of investment made in securities, and the return which the latter must yield to investors. This is determined by competitive conditions in the finance markets of the country. A quotation from a decision of the California Railroad Commission is typical of the attitude of the courts and commissions:

"Ten years ago this Commission allowed eight per cent upon a reasonable estimate of investment as a fair return in certain cases, and subsequent developments have confirmed the reasonableness of such a figure from the standpoint of both the utility and the consumers."³²

The policy of fixing a blanket rate of return on a property regardless of financial requirements has enabled a large number of public service corporations to pay dividends of from 10 to 15% on the common stock, an amount quite unnecessary on stable investments, and a return greater than the public should be required to pay. Moreover, the same policy has led to a development of financial structures which cannot be considered healthy. Under the present system it is to the advantage of the stockholders to raise as much money as possible by means of fixed obligations with relatively low rates of interest, thus leaving a greater proportionate share of income to the stockholders.

This means that financial structures tend to become top-heavy with consequent heavy fixed charges which have to be met in times of stress, if credit is to be maintained and satisfactory service is to be rendered. Furthermore, the fixing of a maximum fair return by legislation, as in the federal law applying to railroads, makes variations according to conditions impossible.³³

Two other points may be considered now in regard to the objections raised by the sponsors of the fair return concept. The public and the utilities alike attach a magical significance to the rate-base and the rate of return. Once a fair return is established it tends to become the customary one, and above all it is soon viewed as the income that *ought* to be satisfactory, regardless of whether it is warranted from a business standpoint. When a rate case is presented under such circumstances, the issue is fought on the ground of whether or not the return allowed conforms to the established rate. Consequently, the battle resolves itself into one of precedents which hark back into the dim past.

Finally, if the definition of a fair rate of return as given by the courts and commissions is to be interpreted literally, then the rate must be a flexible one.

"The return should be reasonably sufficient to assure confidence in the financial soundness of the utility and should be adequate, under efficient and economical management, to maintain and support its credit and enable it to raise the money necessary for the proper discharge of its public duties."³⁴

Obviously, according to this, the rate of return should depend upon the financial needs of the corporation in question. If

³² *Re Rates, Service and Operation of Coast Counties Gas and Electric Company*, 24 Cal. R. C. R. 69.

³³ The writer realizes the Act of 1920 leaves the determination of the actual rate level to the discretion of

the I. C. C., but it is impossible to believe that the commission could fix a rate-level of say 7%, when the recapture provision becomes operative at 6%.

³⁴ *Re Bluefield Waterworks and Improvement Company*, *supra* n. 30.

this is the method the authorities are following, then the *rate* of return is a function of two variables, namely the rate-base and the income requirements. Hence, the rate of return under such circumstances is the percentage of the net income to the base, and in order to obtain this percentage both income and base must be known. An examination of the decisions of courts and commissions, however, seems to show that they do not follow this procedure. Apparently they first try to fix the base, and then adjust the income so that it will give a predetermined per centum return on that base.

IV. Conclusions

The conclusion to be drawn from the preceding sections is that a successful regulatory policy should abandon the artificial concepts of fair value and fair return as *administrative* guides. Rate-making is a problem of economic dynamics and failure to recognize this has led to the present impasse. The decision of the Supreme Court in the St. Louis and O'Fallon case is a compromise and has left the commissions in a quandary as to what to do next. How long this condition will last it is impossible to say. The answer to the enigma seems to lie in a clear-cut and logical separation of the functions of courts and commissions in the field of regulation.

In the early stages of the development of our regulatory policy the Supreme Court took the stand that it did not have the right of judicial review. In *Munn v. Illinois* (1876) it said: "The controlling fact is the power to regulate at all . . . For protection against abuses by legislatures the people must resort to the polls, not to the courts . . ." ³⁵

³⁵ 94 U. S. 113 (1876).

³⁶ *Stone v. Farmers' Loan and Trust Company*, 116 U. S. 307 (1886).

Ten years later a statement was made which foreshadowed judicial review and the emergence of the doctrine of confiscation in connection with regulation. The Court said:

"This power to regulate is not a power to destroy, and limitation is not the equivalent of confiscation. Under pretence of regulating fares and freights, the State cannot require a railroad corporation to carry persons or property without reward; neither can it do that which in law amounts to a taking of private property for public use without just compensation, or without due process of law." ³⁶

A few years later this stand was definitely affirmed.³⁷ This right of judicial review, however, has been interpreted as the right to protect property owners against confiscation, and the Court has stated that it will not interfere with the work of commissions unless the rights and privileges of corporations, as established by constitution and statute, have been violated.³⁸ In other words, the function of the courts is to lay down the basis of confiscation; to set the minimum below which commissions cannot legally go in determining rates. This, of course, raises the issue of how confiscation is to be determined, but may it be remarked that this is only *one* part of the whole problem of regulation.

It is not possible to go into an extensive discussion of what would appear to be a sound theory for the establishment of a bench mark by which confiscation could be determined. This would be aside from the main contention of this paper which is that regulation of public utility rates comprises two distinct issues, the legal one of confiscation, and the administrative one

³⁷ *Chicago, Milwaukee and St. Paul Railway Co. v. Minnesota*, 134 U. S. 418 (1890).

³⁸ See *I. C. C. v. Illinois Central Railroad Co.*, 215 U. S. 452 (1910); and *I. C. C. v. Union Pacific Railroad Co.*, 222 U. S. 541 (1912).

of adequate rates from a business standpoint, the former being merely the starting point of the latter. However, a few suggestions may be offered for the determination of confiscation.

In the first place, some definite stand should be taken by the courts and should be consistently adhered to. Then the commissions would know definitely the legal minimum limiting their powers. One alternative would be to return to the doctrine of *Munn v. Illinois*, in which the Court declined to review the reasonableness of rates as fixed by the State. Then administrative bodies could be saddled squarely with the responsibility of fixing rates that are fair to the public and adequate to the utilities. In other words, the commissions would have the duty of determining what constituted a fair return. This is probably not feasible, however, inasmuch as the courts appear determined to use the doctrine of a fair return on a fair value. If this be the case, then Mr. Brandeis' doctrine of prudent investment seems to be the best approach because it alone can be kept up to date without much dispute, endless litigation, and an enormous expenditure of money. With this as a starting point a definite method by which a fair rate of return can be determined should be given. Then would the limits of confiscation be established. Of course, other alternatives have been advanced by courts and by writers, but, whatever be the choice, some definite fixed rules should be laid down by which confiscation can be ascertained. This is the legal obligation.

³⁹ It is also to be understood that attention should be paid to the designing of rate-schedules which will build up the business by encouraging new demands for service, where this is economically desirable. Also rates should be such as to enable the corporation to build up reserve strength sufficient to pass through times of stress with unimpaired capital, service, and investment stability. The writer realizes, however, that the income allowed to a corporation cannot always be

Now with regard to the function of the commissions, we have come to consider it their duty to prescribe rates which are fair to the public and fair to the utilities, the latter being interpreted to mean rates which will enable the corporations to render adequate service, to expand according to the demands for service,³⁹ and to induce capital into the public utility field sufficient to meet those demands. This capital must be obtained in competition with other industries seeking funds. When these conditions have been met, the rates thus established are reasonable *from an economic standpoint*.

Unfortunately commissions too often have taken the rule established by the courts in setting the minimum to mean that this also determines the maximum return to be allowed, and hence confusion of thought has followed in regard to the functions of these two distinct parts of our government machinery. The duty of regulatory bodies is not the *negative* one of fixing rates which merely escape confiscation, but rather the *positive* duty of fixing rates which are adequate from a business standpoint.⁴⁰ Such a policy of regulation would necessitate the abandonment by commissions of the present approach by which property is "valued" on some basis or other and the return determined by multiplying the base arrived at by some uniform percentage. In its place would be substituted a procedure involving a careful analysis of all factors entering into the structure of a sound business

as much as the concern requires because its customers may not be able to pay that amount. The limitation here is both legal and economic. See, for example, *Rates W. J. Rogers and Central Pacific Land and Lumber Co.*, 7 Cal. R. C. R. 113; *Covington and L. Turnpike Road Co. v. Sanford*, *supra*, n. 14; *Smyth v. Ames*, *supra*, n. 14.

⁴⁰ See Dozier, *op. cit.*, *supra* n. 27, for a discussion of tests to be applied in the determination of adequate rates; see also Bickley, *op. cit.*, *supra* n. 27.

organization. For example, a commission would examine the cost of rendering service, the efficiency and adequacy of service, costs of marketing securities, and the yield which the market is demanding on securities of the corporation.⁴¹ By such a procedure the authorities would be able to decide upon the revenue required for successful operation by the corporations under their control. Then the results so obtained could be tested by established court standards to see if the rates so fixed escaped the legal limitations of confiscation. This procedure would make regulation much more elastic, and, as Glaeser says:

"If commissions are to be held responsible for the economic development of public utilities and for protecting the public interest in them, they must be free to adopt measures which in their opinion are calculated to bring results."⁴²

On this score the Interstate Commerce Act is open to criticism. The Interstate Commerce Commission is hampered in its work by legislation which lays down a definite rule of rate-making. What is necessary is legislation which leaves the administrative authorities with a free hand in rate-making. For example, in California the law places upon the State Commission the duty of fixing reasonable rates, but does not state how the latter are to be determined, nor does it require the Commission to find a "value for rate-making," although this *may* be found if desired.⁴³

The question may be asked: Does the theory advocated do away with the necessity of valuation? If the courts insist upon a valuation for determining confiscation, then certainly it would

have to be made according to their dictates, to determine the legality of the rates established. But may it be urged once again, "fair return on a fair value" is a legal concept and merely sets the lower limits to rate-making. This emphasizes the necessity of a workable legal minimum. The commissions would probably find it necessary to determine an investment in public utility property in order to gauge the reasonableness of capitalization.⁴⁴ But this would be only one of the tests. The problem of a concern which was overcapitalized would have to be dealt with on its merits. In such a case, providing court requirements in regard to confiscation were met, the authorities would have to decide between the alternatives of allowing the corporation to secure sufficient revenue to restore it to a healthy condition, or of compelling a receivership.

Lawyers and commissions may urge that the approach to rate-regulation advanced in the preceding pages is very inexact and unscientific but no one who has ever been guilty of using the word "reasonable" can safely advance such an objection. Nor can the present method of regulation be called scientific when a court decision, the result of skillful legal argument, can change the aggregate rate-base of the utilities of the country by billions of dollars. When we once come to realize that regulation is at bottom an economic problem; that legal theory, instead of stating what economic principles ought to be, must make it possible to meet the economic necessities of the situation; then at least we shall have made a fair start toward success.

⁴¹ It is not possible to go into a discussion of the various tests which administrative bodies would have to use in deciding whether or not rates were adequate from a business standpoint. Nor does it seem necessary to elaborate this aspect of regulation here.

⁴² *Op. cit.*, p. 747.

⁴³ California Public Utilities Act, especially sec. 47; also Constitution of California, Art. XII, sec. 22.

⁴⁴ See J. C. Bonbright, "Railroad Capitalization" (*Columbia University Studies in History, Economics, and Public Law*, No. 215, 1920), Ch. 3; also Bickley, *op. cit.*, *supra* n. 27.

MUNICIPAL OWNERSHIP AND THE CHANGING TECHNOLOGY OF THE ELECTRIC INDUSTRY: TRENDS IN USE OF PRIME MOVERS

By PAUL JEROME RAVER

THE electric light and power industry has been revolutionized on the technical side. What has been the effect of this revolution on municipal ownership, as revealed in the types of prime movers used by municipally owned generating plants?¹

The self-sufficient municipal plant, which generates and distributes all its current, has been disappearing in recent years and its place has been and is being taken by a distributing establishment, either privately or publicly owned, but largely dependent upon privately owned central stations for its energy supply.² While this change has been attributed to the revolution in the technique of electric production operating to the disadvantage of municipal ownership, it has been recognized that these technological forces were effecting a similar change in isolated privately owned establishments.³

Decline in Rate of Acquisition.

There is evidence to indicate that the rate of acquisition of these self-sufficient,

publicly owned electric plants by privately owned, integrated systems has been slowing down since 1926.⁴ Elimination of a large proportion of the smaller and more uneconomical plants and the resulting limited number of these plants left for acquisition has been one factor in this retarded absorption rate.

The higher prices now being asked for the remaining plants constitute another factor. Many publicly owned plants are now located in the midst of a transmission line system in which the already sunk, private investment in production and distribution facilities indirectly provides an additional increment in the price which the municipalities can and do demand for their plants. This improved bargaining power has often resulted in raising the prices asked for such plants to a point where private capital has been forced to pause in its program of acquisition. Again, improved

¹ In *Studies in Public Utility Economics*, Research Monograph No. 1 (*supra*, n. 1) Professor Dorau pointed out that "the economic functioning of all small electric establishments has become less secure and large numbers of them have disappeared. Preliminary reports of the United States Bureau of Census indicate a 43.4% decrease in the number of privately owned establishments between 1922 and 1927. Municipally owned establishments of such size and character that they do not have access to the economies now possible in electric production and distribution, can hardly be expected to withstand the force which in five years reduced the number of private establishments from 3,774 in 1922 to 2,135 in 1927." The same tendency was analyzed in detail for one state (Wisconsin) in a monograph by Dr. E. Orth Malott, *Forces Affecting Municipally Owned Electric Plants in Wisconsin* (Chicago: Institute for Research in Land Economics and Public Utilities, 1930.)

² Behind the Institute's extensive research into the municipal ownership movement in this industry has been the conviction that this phenomenon is explainable in terms of historical, legal, technical, and economic factors. A compilation of all available facts from each of these points of view is being attempted. Results of this research, which was initiated several years ago by Dr. Herbert B. Dorau, have been published by the Institute in a number of state analyses and one national survey.

³ This decline in the number of self-sufficient municipal plants began as early as 1904 in the New England States, was evident by 1914 in the Middle Atlantic and East North Central sections, and since 1920 has manifested itself more especially in the western and southern parts of the country where private capital has but recently pushed its transmission line development.

⁴ The number of municipally owned, generating establishments changing from public to private ownership in each year is as follows: 1926, 224; 1927, 182; 1928, 70; 1929, 41.

municipal finances have in some cases bettered the bargaining power of the municipalities, whereas utilities since the summer of 1929 have not found it quite as easy to secure the capital necessary for financing acquisitions.

Furthermore, the exceptionally favorable money market after 1923 may have encouraged some systems to carry their expansion programs beyond the point of highest-profit combination. The policy of pushing transmission lines into less populous territory may be desirable on social grounds but may lack immediate economic justification.⁵ For the industry as a whole, the investment in power plants per kilowatt of generating capacity has been declining since 1919 but the total investment per kilowatt of capacity has been rising as a result of expansion of transmission and distribution facilities. While the long-time point of view may justify this broadening of the market at the expense of rising capital investment per unit of generating capacity, the fact remains that the resulting slowing down in the rate of capital turnover may well be one other factor now contributing to the lagging rate of acquisition of municipal plants.

These trends indicate that the isolated generating plant may still have economic justification under certain conditions. When the capital cost of bringing energy to customers exceeds the capital cost of generating that energy, one may expect to find cases of effective competition from local generating stations.⁶

⁵ The same thing might be said for "over-engineering" which in some cases has resulted in capital expenditures for heat-saving equipment not justified on economic grounds by the resulting saving in coal cost.

⁶ In large cities, where underground distribution costs are high, central stations face competition from privately owned plants in large buildings or industries. To meet this, distribution costs are sometimes lowered

Certain present day influences in prime-mover development seem to emphasize the importance of this competition from municipal plants. The importance of such influences can be more vividly grasped after an historical sketch of the major technological developments⁷ in the electric industry, particularly as they relate to prime movers.

Historical Survey of Technological Factors

Prime-Mover Development to 1903.

Although the steam engine was reaching the peak of mechanical refinement for industrial use when the first commercial central station was established (1882), coal-burning and other auxiliary equipment was still at a very low stage of efficiency. Steam pressures were low (150 lbs.⁸ was about the maximum in use); over-feed, mechanical stokers had just been developed (1880); and hand firing with horizontal fire-tube boilers was common practice. Hence, so far as mechanical efficiency in generation was concerned, both private and municipal operators began the race for the power business of the country "at scratch." For the first 10 years of this race, the industry was in such an unstable condition financially as well as physically, that little if any differential in favor of either public or private ownership could be attributed to technology. Steam engines driving direct-current (D.C.) dynamos were the common source of energy supply; and service, both public and private, was rendered by small isolated

by running high voltage lines direct from station to building and reducing the voltage at the point of consumption.

⁷ For an interesting paper on certain relations of technology and the market, see E. O. Malott "Technology and the Widening Market for Electric Service," *Journal of Land & Public Utility Economics* 147-156 (May, 1928).

⁸ Initial steam pressures of 450 lbs. to 600 lbs. are now common. For carrying base loads only, pressures as high as 1,400 lbs. may be justified.

plants⁹ and limited to a very narrow market. During these early years it was not so much a question of quality or cost of service as of getting any service at all.

In this race for supremacy attention was first concentrated on the development of internal economies, particularly with respect to improvement in the efficiency of generating equipment. In steam-engine plants, using from 15 to 20 pounds of coal for the production of one kilowatt hour, 75 to 88% of the heat-input to the machine was being discharged through the exhaust pipes. Coal cost therefore represented a considerable percentage of the price of the product. Additional investment in more efficient coal-handling and coal-consuming devices was warranted in the larger cities where a large market existed in a limited area but such improvements¹⁰ were practically closed to municipal or private plants in smaller towns. Hence, we find municipal ownership developing largely with small plants and relatively inefficient generating equipment. In the development of these internal economies we first discern private ownership in a strategic position in the race with municipal ownership because of its advantage in developing the larger markets. Quantity of output rather than numbers of plants became one measure of that supremacy then as now.¹¹

With a recognition that here was a business of decreasing costs, in which differential pricing to customer groups on the basis of ability to pay resulted in intensive exploitation of the local market, private capital was stimulated in the de-

velopment of some method by which the market served by a single station could be widened beyond the limits of a 220-volt distribution system. Higher voltages were experimented with and by 1900 a number of short transmission lines had been developed with voltages from 4500 to 9000.¹² With the development of alternating-current (A.C.) machinery and the transformer by which voltages could be "stepped up" to high pressures for long-distance transmission and then "stepped down" to low pressures for customer consumption, the possibilities of market expansion were enormous. The limiting factor at this time was the steam engine which at 5000 kws. had about reached the limit of its economic size. With the development and first practical installation of a steam turbine in 1903¹³ the stage was set for improving the efficiency of generation, establishing large stations at strategic locations, and further widening the area of the market by extension of transmission lines.

1903 to Wide-spread Interconnection. As the curtain rises in 1903¹⁴ on the technological factors which have influenced the growth and changing character of municipally owned generating stations, we find all small isolated plants facing an apparently hopeless handicap where they are in competition with mass production and distribution. Probably no invention has effected as great and rapid a transformation in the design and utilization of generating equipment as that of the steam turbine.¹⁵ Parsons

⁹ Plants serving a single community only.

¹⁰ As, for example, the underfeed stoker, superheaters, improved boiler construction, etc.

¹¹ In this study we pass over the relative significance of street lighting and commercial light and power in this early period.

¹² In Chicago the first high tension line (4,500 volts) was installed in 1897 between Harrison Street and 27th Street.

¹³ The first 5,000-kw. turbine built was installed in the Fisk Street station, Chicago, in 1903.

¹⁴ Where this study begins.

¹⁵ The turbine is pre-eminent in central power-station service; the high rotative speed facilitates direct connection to generators; the amount of floor space required is less than for steam engines; it can be closely regulated and its efficiency is practically constant under varying loads.

built his first experimental turbo-alternator in 1884.¹⁶ The principle of the rotary steam engine had been known for 2,000 years but it took the insistent urge of necessity to mother this invention which changed the electric light and power business from a local to a national industry in the short space of 20 years.

In these 20 years the obsolescence and inadequacy factors were tremendous. The great growth of the industry could be but partially predicted.¹⁷ While private operators located in good load centers could not afford to disregard the greater economies developed by the new technology, most municipalities with plants in poor load centers, as well as private operators similarly located, could not afford to take advantage of them. The change from D.C. to A.C. furnishes illustration. The cost of making this change was so great, both to the industry and to the consumer, as to be prohibitive in many small isolated plants, whose operating conditions were poor compared to those of the larger cities.¹⁸

In the face of these capital losses, high voltage transmission equipment developed hand in hand with A.C. machinery and interconnection, began its westward sweep. Concurrently, private capital was experimenting with centralized, electrical generation for groups of small communities.¹⁹ It was finding that it could pay substantial prices for these small plants, abandon them, centralize all production in a single station,

and render service from substations at the end of a transmission line network. The idea was not new but the application of the idea to towns which were too small to serve themselves economically was revolutionary. This experiment marked a new phase of extensive market development and, as will be shown in the accompanying statistical analysis, was to be reflected in the number and character of municipally owned generating plants.

By the time of the war the technical advantages of interconnection were more fully appreciated and, furthermore, the necessity existed for seeking them. While interconnection had originally brought obsolescence in its wake, it now served to reduce the obsolescence and inadequacy factors by providing time for delay in adding generating capacity. In the case of hydro-electric developments, interconnection with steam plants took care of diversity in stream flow; as between systems it permitted utilization of the diversity in peak demands and "stand-by" or reserve-plant investment could be minimized. The ability to secure markets was greatly increased where large blocks of surplus power could be transferred from one system to another. Extensive development of transmission lines, which was under way prior to the war, was intensified by the improvement in business and the low cost of capital after 1922 and by the development of that centralized management and control which has character-

¹⁶ This machine had a capacity of only $7\frac{1}{2}$ -kws. and the rotor was only 3 inches in diameter. Forty-five years later (1929) the largest generating unit ever built was installed in the station of the State Line Generating Company—a turbine unit of 208,000 kws. or 278,820 h. p. capacity. The present station is about $\frac{1}{4}$ of its eventual size.

¹⁷ In 1900 a series of 5,000-kw. alternators were installed in the Harrison Street Station of the Commonwealth Edison Company, Chicago. These machines were driven by the most modern Corliss steam engines and the plant was considered a marvel of efficiency.

Four years later these machines were scrapped to make way for turbine-driven generators.

¹⁸ Many municipalities operated their water works in connection with the electric plant. Water pumping by electric power requires large motors which have to be scrapped or new investments made in conversion equipment if a change is made from D. C. to A. C.

¹⁹ One of the first experiments of the kind was made with 22 small towns in Lake County, Illinois, in 1910. (Samuel Insull, *Twenty-five Years of Electric Power* (The Electric Association, 1927)).

ized public utilities, especially in the past decade.

Effect on Small Plants. The resulting sharp decline in the number of small plants and the changing technical character of all isolated generating stations, including those municipally owned, have already been noted.²⁰ As early as 1900 predictions were made that, in the race for a place in the electric industry, the municipal plant would soon be outdistanced. That it has been outdistanced, if the measure is quantity-of-energy-produced, there can be no question. The prophecy has not been fulfilled if numbers-of-establishments is the measure to be used, although even here the number of municipal generating plants in existence is back today almost where it was in 1903.²¹

While these technological and economic factors would seem insurmountable in isolated plant generation, we find the effect varying in importance in different sections of the country.²² The lag in the spread of interconnection to the west and south provided opportunities for isolated plant developments and in these sections of the country we find the internal combustion engine exerting considerable influence in the municipal ownership movement.

Present Day Tendencies. While municipalities have been handicapped by

market limitations in their efforts to produce electricity efficiently,²³ the economic position of the small plant may be improved by a lowering of generating costs. This has been effected in some cases by the introduction of engines with higher thermal efficiencies²⁴ than are possible with steam engines. Whereas an ordinary steam-engine plant will have a thermal efficiency of only 4.5%, an ordinary gas-engine plant will effect efficiencies of from 13% to 21%, and the more recently developed Diesel engine will utilize as much as 33% of the heat energy in the fuel. Even the best steam turbine plant will develop hardly more than 18% thermal efficiency.²⁵

The type of prime mover used in the municipal plant has also been influenced by the location of the community with respect to natural resources. The availability of an adequate and suitable water supply for hydro-electric power or for use in generation with coal; the use of gas as a fuel and its availability through long-distance transmission;²⁶ the utilization of oil resources made available through development of the Diesel engine—these and other similar factors have affected the cost of fuel for generation and thus have influenced the competitive position of the isolated plant in the electric field.

Improvements in the design of oil engines have been attracting considerable interest, especially in sections where oil

²⁰ Herbert B. Dorau, *The Changing Character and Extent of Municipal Ownership in the Electric Light and Power Industry*, (Chicago: Institute for Research in Land Economics and Public Utilities, 1929).

²¹ In 1903, 920 generating plants were in existence. The peak year was 1920 with 1907 plants in existence and on April 1, 1930, the number had declined to 979. If we include establishments purchasing all of their output, the score is much more favorable for municipal ownership. The total, including such purchasing establishments, was 937 in 1903; 3,066 in 1923; and 2,094 as of April 1, 1930.

²² *Supra*, n. 2.

²³ As well as by legal barriers and in some cases managerial incompetence.

²⁴ Percentage of heat energy in fuel in the furnace which is utilized in the form of useful energy at the machine.

²⁵ Experimental installations using high-pressure, high-temperature steam and operating on a reheat cycle have shown higher thermal efficiencies. Higher thermal efficiencies, of course, do not necessarily result in lower total production costs.

²⁶ For example, the city of Monroe, Louisiana, located in the Richland Field, pays only five cents per 1,000 cu. ft. for natural gas to fire the boilers of its municipally owned electric light plant. On a B. t. u. basis this is equivalent to 65 cents per ton for 13,000 B. t. u. coal.

is the cheapest fuel available. The development of the Diesel engine within the last 10 years is of particular interest. Manufacturers have been rather slow to see the full possibilities of exploitation in the electric field but have found some vulnerable spots in the transmission line network. Whether by high pressure salesmanship, partial-payment-plan financing, or factual cost analysis, they are rather effectively convincing officials of some municipalities that isolated generation of electricity may, under certain conditions, result in a production cost below the price at which private companies will or can deliver energy from a transmission line.

These are technological factors, some of which have operated in favor of municipal ownership just as surely as transmission line development and economies of large-scale production have thus far operated against it. How important are these factors? What type and horsepower of prime mover have prevailed in those plants which could not withstand the pressure of the new technology? What type of prime mover was used when the municipal plant originated? What type was in existence when it changed to a purchasing establishment or to private ownership? And more important still, what type of prime mover has prevailed and exists in those plants which are still municipally owned and operated? Are these remaining plants strategically located in the transmission line network; have they satisfactory

natural resources available; or will the pressure of economic forces and the new technology continue detrimental to municipal ownership? The purpose of this and subsequent articles on technology is to present fundamental facts about municipally owned plants upon which a critical analysis of these questions may be based.

Scope and Methodology of Present Survey

The first step in this study has been an effort to secure all data on type and horsepower of prime movers in municipal plants from 1903 to April 1st, 1930. It is impossible, within the limits of this paper, to present effectively this material for all sections of the country. The data are therefore limited to the numbers of different types of prime movers used by municipally owned generating establishments in the West North Central geographic division, including those purchasing a part of their output. The horsepower capacity of these prime movers and comparison of the trends with other sections of the country must be reserved for subsequent articles.

Areas Studied. The selection of this particular geographic division is justified by the relatively large number of isolated generating establishments remaining in this section. Of all municipally owned generating plants in existence in the United States, as of April 1, 1930, 36.5% were in this division (Table I). These plants are largely on the economic frontier, the fringe of the present transmission line network.²⁷ The seven states

²⁷ A measure of the advancement in the art in this section as compared with the entire country is given by the United States Census figures for D. C. equipment. In 1902, 60% of the commercial and 55% of the municipal dynamos of the country were generating direct current. By 1922 only 17.5% of the private stations and 17% of the municipal stations used D. C. equipment. In this geographic division, the percentages for 1902 were the same as for the country as a whole but in 1922, 29% of the commercial and 31% of the municipal dynamos were still operating D. C. There is some justi-

fication in referring to towns as "sub-marginal" where they have been unable to afford a change from D. C. to A. C. equipment. If these figures are a measure, towns in this section of the country are, as a group, further below the "margin" of economic generation than plants of the United States as a whole. As such, they offer another reason for not being absorbed in a transmission line network, especially if the system has been pushed into thinly populated territory and no cushion exists in net income for absorbing marginal plants.

of this geographic division²⁸ are much alike in their market characteristics. Small agricultural communities predominate; they are rather widely separated; and the market for electrical service is thus restricted.

TABLE I. NUMBER AND PERCENTAGE DISTRIBUTION OF MUNICIPALLY OWNED GENERATING ESTABLISHMENTS IN EXISTENCE AT APRIL 1, 1930, BY GEOGRAPHIC DIVISIONS

Geographic Divisions	Number of Generating Establishments in Existence April 1, 1930*	Percentage of Total Generating Establishments
Total.....	979	100.0
West North Central.....	357	36.5
East North Central.....	200	20.4
West South Central.....	118	12.1
South Atlantic.....	94	9.6
Mountain.....	67	6.8
East South Central.....	50	5.1
Middle Atlantic.....	47	4.8
New England.....	30	3.1
Pacific.....	16	1.6

*Includes 107 establishments which were purchasing part of their output in 1930.

Period Covered. While previous studies already published have carried the statistical information back to 1882, the limitations as to sources of information have made it necessary to begin this study at the year 1903. Fortunately this limitation is relatively unimportant, since the steam engine was the only prime mover extensively in use in municipal plants prior to 1910, and the peak of that use falls in the period studied.

Definition of Terms. For our purposes, generating plants include plants which

²⁸ Nebraska, Iowa, North and South Dakota, Minnesota, Kansas and Missouri.

²⁹ There may be some doubt as to the advisability of including plants which purchase a part of their output as generating establishments. It is true that they are not entirely "self-sufficient" establishments, but the degree of their self-sufficiency is not known. In so far as the information was available all plants of a purely stand-by character, in which practically all of the output is purchased, have been eliminated. For purposes of the horsepower analysis it was considered advisable to keep the balance of the purchasing-part plants in the study. In any event the number of such plants has never been a large percentage of the total. Only 21 of the 357 generating plants in this division, as of April 1,

are generating or have generated all or part of the current distributed.²⁹ These plants will be treated by type of primary power used, and the plant will be considered as the economic unit rather than the single engine.³⁰

Oil-engine plants refer to the use of oil engines only. The term "oil engine" is used to include engines operating on the Diesel principle, and surface-ignition engines using crude oil introduced directly into the engine cylinder and ignited by the hot bulb principle or directly by the heat created by compression.

The term "gas engine" is used to designate engines using manufactured gas, natural gas, or producer gas for fuel.

"Other internal combustion engines" refers to a group of gasoline, kerosene, "Delco," "Kohler" and other similar types, using high grade distillates for fuel but lacking certain characteristics of the gas and oil engine classes.

Hydro-electric plants are designated by the use of the term water wheels, and

1930, purchased part of their output. In order to preserve scientific accuracy, the number of plants included in the accompanying study but purchasing part of their output is given in the following table:

Year	Steam Engine Plants	Steam Turbine Plants	Oil Engine Plants*	Gas Engine Plants	Water Wheel Plants	Composite Plants
1911.....	1	...	...	...	...	...
1912.....	2	...	...	...	...	...
1913.....	3	...	...	...	...	...
1914.....	4	1	...	...	...	...
1915.....	5	1	1	...	...	1
1916.....	6	1	1	...	...	1
1917.....	6	1	2	...	...	...
1918.....	7	1	3	...	...	1
1919.....	8	1	2	...	...	2
1920.....	8	1	3	...	...	1
1921.....	7	1	2	...	...	1
1922.....	6	1	4	1	...	...
1923.....	7	1	6	1	...	3
1924.....	7	1	7	3	...	3
1925.....	6	1	8	2	...	3
1926.....	7	1	10	1	...	4
1927.....	8	1	8	1	...	5
1928.....	6	1	9	1	1	4
1929.....	3	1	9	1	1	6
1930.....	3	2	9	1	1	5

*There was 1 "other internal combustion engine" plant in 1921.

³⁰ The *Census of Electrical Industries* at five-year intervals enumerates the total number of engines and the total horsepower by types of prime movers (except that oil and gas engines are not differentiated) but the total horsepower of a single plant cannot be determined.

steam plants are divided between those using reciprocating steam engines and those using some form of steam turbine.

Where a plant uses more than one type of prime mover, such as "gas and oil" or "steam engine and steam turbine," it is designated as a composite plant.

Other terms used in this study correspond to the usage given them in previous articles published.

Sources. Starting with the *McGraw Central Station Directory* (years 1903 to 1929 inclusive) as a background, the information given there was submitted to plant managers and city clerks for checking and correction. A special questionnaire was prepared for this work which proved fairly effective. In addition, books, periodicals, bulletins of municipal leagues and other articles giving historical accounts and data on mechanical equipment in municipal plants were examined as far back as 1903. In addition the records of primary-power equipment in plants acquired by private companies were secured from those companies in a number of cases. Finally, the lists of many engine manufacturers were secured and these aided materially in checking up engine installations.

The Annual Net Change³¹ in Number of Generating Establishments

At the close of 1903, 207 of the 212 municipally owned generating establishments which had then originated in the West North Central division were still in existence (Table II) and of these, 96% used steam engines only. If obtainable, figures for isolated private stations of a similar character in this division would probably show a comparable predominance of steam engines. This engine

³¹ "Net change" refers to number in existence in each year resulting from annual additions and subtractions.

continued in popular favor for a number of years in these establishments and we find them used exclusively in 76.2% of the municipal plants in this division as late as 1910, whereas the larger stations of the country had changed to steam turbines by this date.

TABLE II. NUMBER OF MUNICIPAL GENERATING ESTABLISHMENTS, WEST NORTH CENTRAL GEOGRAPHIC DIVISION, BY TYPE OF PRIMARY POWER, BY YEARS 1903-1929, AND AT APRIL 1, 1930

Years (As of December 31)	Total Generating Plants in Existence	Steam Engines Only	Steam Turbines Only	Oil Engines Only	Gas Engines Only	Other Internal Combustion Engines Only	Water Wheels Only	More Than One Type of Prime Mover
1903.....	207	190	.....	.....	3	.....	4	1
1904.....	227	220	.....	.....	2	.....	4	1
1905.....	238	224	.....	1	5	1	4	3
1906.....	257	233	.....	3	11	1	4	5
1907.....	273	241	.....	3	17	1	4	7
1908.....	299	215	.....	6	25	1	5	7
1909.....	317	262	.....	9	32	1	4	9
1910.....	317	272	.....	22	44	2	3	14
1911.....	383	272	.....	27	54	3	3	24
1912.....	420	260	2	46	64	6	3	30
1913.....	451	266	3	63	75	5	5	34
1914.....	494	261	5	93	85	6	5	39
1915.....	539	256	4	123	92	11	5	48
1916.....	557	245	5	151	91	12	6	47
1917.....	568	235	8	170	80	12	7	47
1918.....	591	228	8	193	97	13	7	45
1919.....	609	222	8	214	92	13	7	53
1920.....	619	211	9	238	91	14	7	59
1921.....	615	200	9	238	85	15	7	61
1922.....	602	182	11	253	72	16	8	60
1923.....	573	160	15	254	50	15	8	62
1924.....	538	142	17	251	46	12	7	63
1925.....	493	115	20	237	37	13	7	64
1926.....	439	68	21	228	22	9	7	54
1927.....	391	90	21	203	15	2	6	54
1928.....	376	77	22	203	12	2	6	54
1929.....	355	65	22	199	8	2	6	53
1930 to April 1st..	357	62	23	202	8	2	6	54

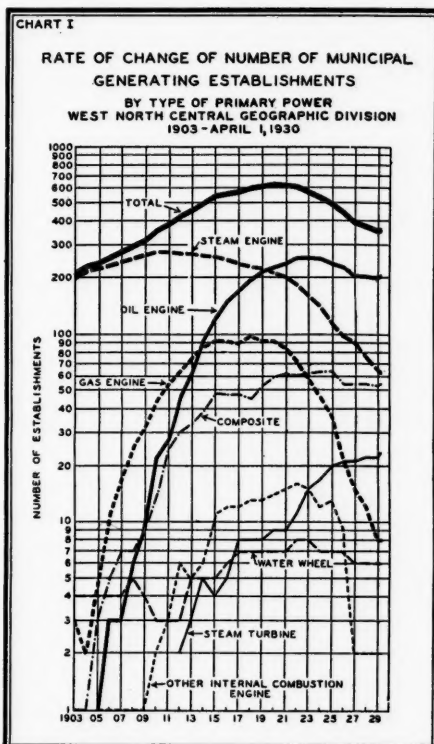
In the meantime oil- and gas-engine developments were making considerable progress. As a result, the number of steam-engine plants continued to decline, while the total number of generating plants continued to increase to a peak of 619 in 1920. In this year, 34.1% of all plants used steam engines exclusively; 36.8% used oil engines only; and 14.7% had only gas engines as prime movers.

The gas engine ranked second to the steam engine in numerical significance until 1913. This engine eliminated the personal element in efficient fuel utilization by eliminating the fireman; it

removed the difficulties of steam generation where the quality of boiler feed-water was poor; and it offered possibilities of lower cost fuel in fields where natural gas was available. We find the gas engine developing uniformly in each of the seven states of this division and reaching a peak of its popularity at the end of 1918, when it was used in 16.4% (97) of the plants. After that year the decline in number has been very rapid (Chart I).

Oil Engine Development. It is interesting to note the alacrity with which municipalities turned their attention to the oil-engine for service after 1912.³² The first oil-engine plant in this division was established in 1905 and, by 1911, 27 were in existence. The American patents on the Diesel engine³³ expired in 1912 and from 1912 to 1921 the rate of increase of oil-engine plants was more rapid than that for any other type of prime mover (Chart I). The peak of the oil-engine development was reached in 1923 with 254 plants, or 44.3% of all in existence. While the number in existence has declined in each year since 1923, the oil-engine plants have constituted an increasing percentage of the total in existence (56.1% in 1929) and in the first three months of 1930 registered a slight increase (3) in number over 1929. It is significant to note that the only other type of prime mover to register a continuous increase in this percentage relationship since the peak of the total number of generating plants in existence was reached in 1920 has been the steam turbine. In a subsequent article on horsepower it will be shown that steam-

turbine plants, while relatively few in number, have always exceeded oil-engine plants in total horsepower capacity, although both types have shown marked increases in total horsepower since 1918.



The peak of the oil-engine movement in this division was reached coincident with the easing up in money rates. This lowering of the cost of public utility capital undoubtedly acted as a spur to private acquisition which resulted in a sharp decline in number of all plants except those powered by steam turbines.

³² The writer is indebted to Mr. Otto Meltzer for aid in compiling the data for oil-engine plants in this geographic division. "The Importance of the Diesel Engine in Municipally Owned Electric Plants of the West Central United States" was presented by him as a thesis for the M. B. A. degree at Northwestern University, May 15, 1930.

³³ These patents, granted in 1895 to Dr. Diesel, were purchased by Adolphus Busch. "The fact that sales of engines were very sluggish until 1912 is traceable to two factors—the opposition that every revolutionary process or machine encounters and the exclusive possession of the American patent rights by a single company." L. H. Morrison, "Oil and Gas Engine Development," 52 *Mechanical Engineering* 351 (1930).

However, the rate of decline of the oil-engine group was so much slower than that experienced by gas and steam engines (Chart I) that one is inclined to suspect a tangible resistance to private acquisition of these plants.

Composite Plants. This hypothesis is further strengthened when we examine the character of the composite plants which have shown a similar stability in the face of adverse economic and technological developments. Plants using more than one type of prime mover have been significant in number since 1910, and, as might be expected because of the continual shifting of plants into, as well as out of, this classification, have made a rather stable contribution to the total number throughout the period (Table II). An analysis of the various combinations of power equipment which have existed in this division is given in Table III.

Again, the stabilizing influence of the steam turbine in those plants which were large enough to warrant steam-turbine operation is apparent. Steam turbines combined with steam engines exercised an increasing numerical influence until 1925, when they reached a total of 24 or 37.5% of the total number of composite plants in existence in that year. While they had declined to 18 in 1929, they still represented 34% of the total number of composite plants. Similarly, combinations of oil engines with steam engines have shown a fairly consistent increase, with the maximum number in the period (22) on April 1, 1930. At this point they represented 40.7% of the total number of composite generating plants. Steam engines and gas engines proved a poor combination in the experience of plants in this geographic division, all such combinations having disappeared by 1927, while gas engines combined with oil engines had slightly better

TABLE III. NUMBER OF MUNICIPAL GENERATING ESTABLISHMENTS IN EXISTENCE HAVING MORE THAN ONE TYPE OF PRIMARY POWER, WEST NORTH CENTRAL DIVISION, BY YEARS 1903-1929 AND APRIL 1, 1930

Year	Total	Steam Engine and Steam Turbine	Steam and Oil Engines	Steam and Gas Engines	Steam Engine and Water Wheel	Steam Turbine and Oil Engine	Oil and Gas Engines	Oil Engine and Water Wheel	Gas Engine and Water Wheel	Other Composite Plants
1903.....	1				1					
1904.....	1				1					
1905.....	3	1			2					
1906.....	5	1			4					
1907.....	7	2		1	4					
1908.....	7	2		1	4					
1909.....	9	3		2	4					
1910.....	14	4	2	5	5					
1911.....	24	7	3	7	3			1	2	1
1912.....	30	8	4	9	3			1	3	1
1913.....	34	9	6	10	3			2	3	1
1914.....	39	10	10	10	3			2	3	1
1915.....	48	13	11	12	5			2	3	2
1916.....	47	13	10	11	5			3	3	2
1917.....	47	13	8	9	4			7	4	2
1918.....	45	15	6	7	4			1	9	1
1919.....	43	15	8	9	4			1	9	1
1920.....	59	19	13	6	3			1	9	1
1921.....	61	21	14	6	3			1	9	1
1922.....	60	21	16	3	2			1	7	6
1923.....	62	22	18	3	2			1	8	6
1924.....	63	23	20	1	2			1	8	6
1925.....	64	24	21	1	2			1	7	6
1926.....	54	21	16	1	2			1	4	6
1927.....	54	19	17		2			1	5	6
1928.....	54	17	19		1			2	4	7
1929.....	43	18	21		1			2	3	5
1930 to April 1st	44	17	22		1			3	5	4

survival qualities. Similarly, water wheels when supplemented by oil-engine power have maintained their numerical position fairly well, whereas the last gas engine and hydro-electric combination departed in 1921.

Changes of Primary Power in Existing³⁴ Plants

An analysis of the year-to-year changes³⁵ of types of prime movers offers further indications of a definite trend to the oil engine. For example, since 1911, 79 plants have changed to oil engines directly from some other type of prime mover and 55 of these changes were made after 1921. In addition, 92 plants have at some time been in this transitional stage, using oil engines in connection with some other type of prime mover and 44 of these have completed the

³⁴ Existing at the end of each year.

³⁵ Space limitations prohibit presentation of tables of these transitions year by year.

transition to oil engines only. Contrasted with these figures the movement in the opposite direction (i. e., from oil engines to some other type) has been insignificant. In the entire period from 1903 to April 1st, 1930, only four plants have changed completely from oil engines to another form of primary power and only eight have added some other type to existing oil-engine equipment. All of these reversions took place prior to 1925.

The significance of this transitional stage is emphasized if we now examine the experience of the gas engine in a similar way. In the entire period only 12 plants have changed to gas engines directly from some other form of motive power and only 21 have added gas engines to other existing prime movers. All of these changes occurred prior to 1924. However, 43 plants, which had gas engines only, changed to another type entirely; 18 added other types to existing gas-engine equipment; and 31 eliminated gas engines from their existing combinations. Practically all of these changes occurred between 1914 and 1928. The trend here is distinctly opposite to that noted for oil engines.

The changing character of steam-engine plants offers an even more striking analogy. In the 30-year period, 56 establishments abandoned steam engines as their only type of prime mover in preference for some other type; 112 added some other type to existing steam engines;³⁶ and 56 completed the transition by abandoning the steam-engine portion of their composite plants. The majority of these changes have occurred since 1920. Contrasted with this only 11 plants changed completely from another type of motive power to the use of steam

engines only (and all of these changes occurred prior to 1923); eight plants added steam engines to existing prime movers of another type; and, prior to 1924, 16 changed from part steam to steam engines only. Again the trend is opposite to that displayed by oil engines.

If these municipalities have had opportunities to sell their plants³⁷ to private companies, their activities in replacing or supplementing obsolete equipment with more modern engines undoubtedly has greatly increased their resistance to private ownership—a resistance which first manifests itself in these figures after 1912 and which seems to have been fostered by the more recent developments of the oil engine. The motive back of a change in plant equipment is similar to the motive which prompts a change in ownership; it is largely economic. The obsolete unit is replaced by an oil engine because it is expected to lower costs of generation or because local conditions do not warrant the installation of steam turbines. And it may well follow that such a prospective increase in plant efficiency may have caused municipal officials to decide that the price offered by private operators for acquisition of the plant was too low or the rates offered for service under private ownership were too high.

Here then is evidence that an increasing number of municipal plants existing after 1912 are oil-engine plants or steam-turbine plants or plants in the transition stage toward the use of these prime movers. Municipalities seem to be responding to the *economic* appeal made by these newer developments in technology.³⁸ The fact that the oil-engine development is comparatively recent may account in part for the favorable situation which the above figures depict.

³⁶ The first step in retirement of obsolete equipment.

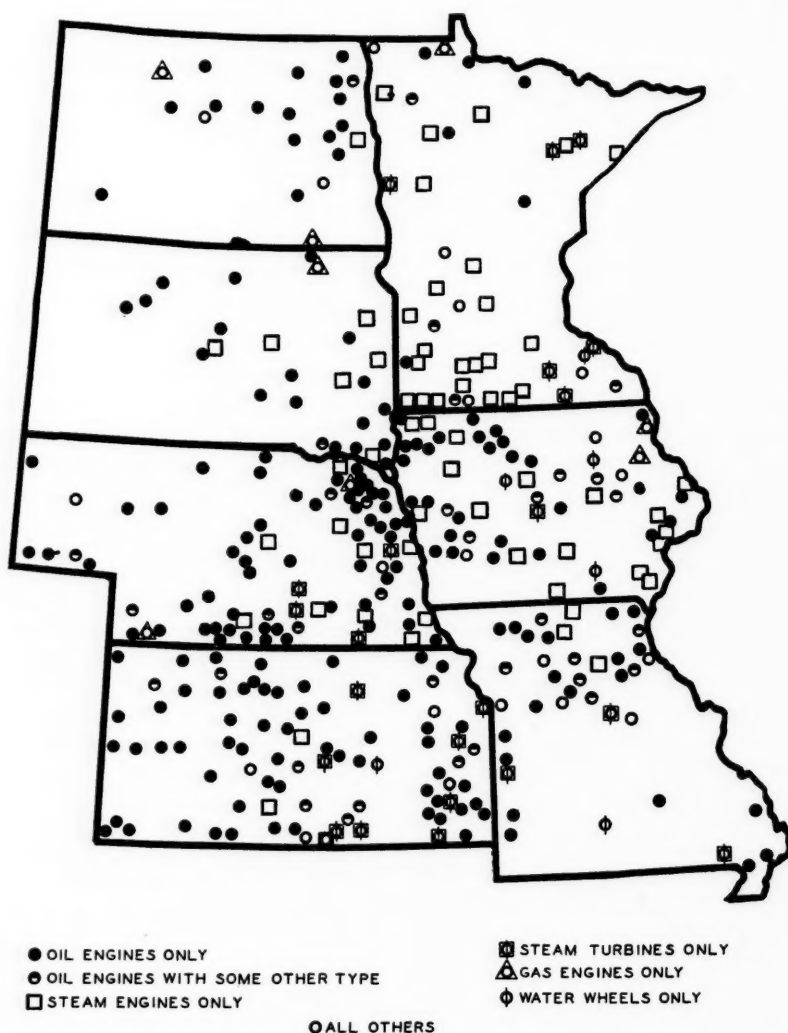
³⁷ Since many of the changes described have been taking place since 1920, it is likely that such opportunities have been offered to many of them.

³⁸ This hypothesis is further strengthened by the analysis of horsepower capacity and horsepower grouping which will be made in a subsequent article.

CHART II

MUNICIPALLY OWNED GENERATING ESTABLISHMENTS

CLASSIFIED BY TYPE OF PRIME MOVER
WEST NORTH CENTRAL GEOGRAPHIC DIVISION, APRIL 1, 1930



Certain economic advantages of the oil engine for small isolated stations³⁹ have recently been emphasized by manufacturers. Furthermore, "payment for the plant out of profits" is an argument which is being used effectively and a new financing corporation is already in the field to relieve manufacturers of the burdens of the partial payment plan.

The appearance of oil engines in these plants in connection with other types of prime movers is therefore to be expected. Whether they will continue to supplant other forms of primary power will depend somewhat on the future significance of the obsolescence factor,⁴⁰ as well as upon the effectiveness of the price competition which private companies will be able to exert in these small communities. A cross-section of Chart I at April 1, 1930, is given by the geographic distribution of these plants, Chart II.

The number of plants in existence at the end of each year, by type of primary power, is in a sense a static picture or annual balance sheet. The internal transitions from one type of prime mover to another within the plants existing at the end of each year have been discussed. The picture afforded by the resulting balance sheet is more clearly understood if we examine the "income and expense statements"—the annual gross additions of new plants and the losses of old plants by type of prime mover.

Annual Additions

Referring to Table IV, 690 municipal generating establishments originated in

this geographic division in the period 1903 to April 1st, 1930.⁴¹ Of this number 194 or 28.1% began operations with steam engines as the only type of prime

TABLE IV. NUMBER OF MUNICIPAL GENERATING ESTABLISHMENTS ORIGINATING IN THE WEST NORTH CENTRAL DIVISION, BY TYPE OF PRIMARY POWER, AT DATE OF ORIGIN, 1903-1930.

Year	Total	Steam Engines	Steam Turbines	Oil Engines	Gas Engines	Other Internal Combustion Engines	Water Wheels	Composite Plants
1903.....	19	19	.....	.....	.....	.....	.....	.....
1904.....	21	21	.....	.....	.....	.....	.....	.....
1905.....	13	8	.....	1	3	.....	.....	1
1906.....	20	13	.....	2	5	.....	.....	.....
1907.....	19	13	.....	.....	.....	.....	.....	1
1908.....	27	19	.....	3	8	.....	.....	1
1909.....	20	11	.....	3	6	.....	.....	.....
1910.....	45	16	.....	13	12	1	1	2
1911.....	30	9	.....	6	11	1	.....	3
1912.....	41	9	1	18	9	3	.....	1
1913.....	42	8	1	16	12	.....	2	3
1914.....	52	7	.....	28	14	1	1	1
1915.....	60	9	.....	28	15	5	.....	3
1916.....	43	11	.....	23	7	1	1	.....
1917.....	34	4	.....	16	10	2	1	1
1918.....	41	3	.....	27	10	1	.....	.....
1919.....	35	6	.....	26	3	.....	.....	.....
1920.....	38	4	1	19	11	2	.....	1
1921.....	25	2	.....	19	2	1	.....	1
1922.....	24	3	.....	14	3	3	.....	1
1923.....	12	2	1	6	2	1	.....	.....
1924.....	7	1	.....	6	.....	.....	.....	.....
1925.....	6	.....	1	1	2	2	1	.....
1926.....	2	.....	.....	3	3	.....	.....	.....
1927.....	2	.....	.....	2	.....	.....	.....	.....
1928.....	1	.....	.....	1	.....	.....	.....	.....
1929.....	3	.....	.....	3	.....	.....	.....	.....
1930 to April 1st.....	3	.....	.....	3	.....	.....	.....	.....
Total.....	690	194	5	287	153	24	8	19

mover and 87% of these began before 1917. Only five placed their initial reliance solely upon the steam turbine. Contrasted with this we find a total of 287 or 41.6% originating with oil engines only, and 90% of these started after 1911. Municipal ownership began with a gas-engine plant in 153 (22.2%) of the cases and 75% of these originated in the period 1910-1920.

these of which 66 began municipal operation with steam engines, 2 with steam turbines, 60 with oil, 29 with gas and 3 with other internal combustion engines, 1 with water wheels and 9 with composite engine equipment. Also it should be noted that municipal establishments changing from purchasing all of output to generating all accounted for 6 originations, 1 oil engine plant in each of the years 1915, 1922, 1924 and 1928, 1 gas-engine plant in 1910 and 1 steam-engine plant in 1917.

³⁹ Especially on the fringe of the transmission line network.

⁴⁰ The possibilities of natural gas for fuel may enter here, as well as new developments in power-production equipment.

⁴¹ Of the plants originating only two began as generating part and purchasing part of their output. Both these were steam-engine plants. Plants originating included those purchased by municipalities from private companies. In the period studied there were 169 of

Thus we have three overlapping periods during which each of three types of prime movers was most active when generating plants were started. Steam-engine development is confined largely to the period prior to 1917 with the peak year of originations as early as 1904. Oil-engine development has been significant since 1911 and the gas engine enjoyed a short period of popularity from 1910 to 1920.

If we include the 24 plants starting with "other internal combustion engines"⁴² we find that 464 or 67.3% of the 690 originations began operation with some type of internal combustion engine. These figures indicate the important part played by these engines in supporting the gross numerical increase in municipal ownership in this division.

The popularity of the oil engine as a medium for starting new municipal enterprises seemed to reach a peak in 1915 when 28 such establishments began. However, something was happening to bestir the acquisitive interest of private capital in these hitherto unattractive locations, for the number of oil-engine originations dropped to 23 in 1916 and to 16 in 1917. The experiment of serving small communities from a central station was beginning to bear fruit.

In 1918 and 1919 the drain on private capital in supplying the instruments of war reacted unfavorably on public utilities and expansion programs were curtailed. This seemed to remove the economic pressure from municipal ownership temporarily and the number of oil-engine establishments originating increased to 27 in 1918 and 26 in 1919. In 1920, 19 more oil-engine plants began operations. No other type of prime mover elicited any particular interest in these years among municipalities seeking

electric service. After 1922, municipal ownership continued to respond to the pulse of economic forces. Private capital seemed to be getting its "second wind." Only 24 municipal plants began in this year but 14 of these were oil-engine establishments. By 1923 only 12 plants originated and only six of these were powered by oil engines. In 1924, six of the seven originations were oil-engine plants. Since then the number of plants originating has never been greater than three in one year but all these began with only oil engines for primary power.

Annual Deductions

The gross deductions are composed of plants changing directly to private ownership and plants changing from generating all or part of their output to purchasing all of the current distributed. The changes to private ownership will be considered first.

Changes to Private Ownership. A total of 305 generating establishments changed to private ownership in this division during the period from 1903 to April 1st, 1930 (Table V). In the first 13 years (one-half of the period) only 26 plants had changed to private ownership and 24 of these were powered by steam engines. Private capital was evidently not actively interested in acquisition of these plants up to the end of 1915. In the next two years, however, 28 plants changed to private ownership, two more than changed in the previous 13 years. From 1918 to 1922 we again see the effect of the war in restricting private acquisitions as only 49 plants were acquired in five years, and the annual additions of new generating establishments were still more than sufficient to offset the losses.⁴³ The rate of acquisition then increased from 21

⁴² For the distinction see "Definition of Terms," p. 247.

⁴³ Because of the steady popularity of the oil engine up to this time.

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in 1923 to 45 in 1926⁴⁴ and since that time has been declining with only one plant acquired in the first three months of 1930.

TABLE V. NUMBER OF MUNICIPAL GENERATING ESTABLISHMENTS CHANGING TO PRIVATE OWNERSHIP IN THE WEST NORTH CENTRAL DIVISION, BY TYPE OF PRIMARY POWER AT DATE OF CHANGE, 1903-1930

Year	Total	Steam Engines	Steam Turbines	Oil Engines	Gas Engines	Other Internal Combustion Engines	Water Wheels	Composite Plants
1903	1	1						
1904	1	1						
1905	1	1						
1906	1	1						
1907	1	1						
1908	1	1						
1909	3	3						
1910	2	2						1
1911	2	2						
1912	6	6						
1913	4	4						
1914	4	3						
1915	16	10			4			2
1916	12	4		2	3	1		2
1917	9	4		3	1			1
1918	8	3		3	2			
1919	13	6		4	2			1
1920	9	5		2	1			1
1921	10	2		4	3	1		
1922	21	2		8	5	2		4
1923	18	4		7	4	2	1	
1924	41	11		22	5			3
1925	45	7	1	20	10	3		4
1926	40	2	1	27	4	6		
1927	16	4		11	1			
1928	20	2		10	3			5
1929	1			1				
1930 to April 1st								
Total	305	90	2	124	49	15	2	23

Prior to 1923 no year saw more than four oil-engine establishments changing to private ownership. In 1923, eight such plants were sold and in 1925, 22 were acquired by private companies. The year 1927 was bad for the internal combustion engine plants, for 37 out of a total of 40 changing to private ownership were in this engine classification and 27 of these were oil-engine plants.

It is apparent that by 1923 the cumulative effects of the new technology and a favorable money market were sufficient

to offset numerically the rising tide of the internal combustion engine. The gas-engine plants seemed unable to offer any material resistance to these economic forces. Thirty-five of these plants changed to private ownership after 1921 and only 10 new plants began with gas engines in the same period. The oil-engine plants, however, resisted the forces fairly well up to 1925. Prior to that year 274 such plants originated and only 33 had changed to private ownership. In the next five years, however, 90 oil-engine plants changed from municipal to private ownership and only 10 new plants originated with this primary power.

With the growth of the transmission line network the numerical extension of municipal ownership was experiencing increasing opposition. The experimental period of transmission line development had passed by 1916 and had it not been for the war it is probable that the decline registered in the number of municipal plants after 1923 would have occurred about five years earlier.

The full effect of these forces is not reflected in the number of plants changing to private ownership. It will be recalled that the number of new establishments was more than enough to offset the losses by private acquisition as late as 1922. However, the peak number in existence was actually reached as early as 1920, falling short of 1922 because of the increasing number of plants which were by this time changing from generating to purchasing establishments.

Changes to Purchasing. An analysis of this movement is given in Table VI. By December 31st, 1929, 222 generating establishments had abandoned or sold their primary-power equipment and were

⁴⁴ During the war and post-war periods, many municipalities had curtailed paving work and other public improvements. The need for these coupled with the

possibility of increased taxes probably accounted for a part of this heavy decline.

purchasing all current distributed.⁴⁵ The first loss of this character was registered by a steam-engine plant in 1905. Steam engine plants accounted for 82 (37%) of such changes but 69 or 84% of these had taken place by the end of 1923. The oil engine accounted for 77 losses but 87% of these occurred from 1920 to 1927.

TABLE VI. NUMBER OF MUNICIPAL GENERATING ESTABLISHMENTS CHANGING TO PURCHASING IN THE WEST NORTH CENTRAL DIVISION, BY TYPE OF PRIMARY POWER*, AT DATE OF CHANGE, 1903-1930

Year	Total	Steam Engines	Oil Engines	Gas Engines	Other Internal Combustion Engines	Water Wheels	Composite Plants
1903.....	.....	.....	.....	.....	.....	.....	.....
1904.....	.....	.....	.....	.....	.....	.....	.....
1905.....	1	1	.....	.....	.....	.....	.....
1906.....	.....	.....	.....	.....	.....	.....	.....
1907.....	2	2	.....	.....	.....	.....	.....
1908.....	.....	.....	.....	.....	.....	.....	.....
1909.....	2	1	.....	.....	.....	1	.....
1910.....	3	2	.....	.....	.....	1	.....
1911.....	2	1	.....	1	.....	.....	.....
1912.....	2	2	.....	.....	.....	.....	.....
1913.....	5	4	.....	.....	.....	.....	.....
1914.....	5	1	.....	3	.....	1	.....
1915.....	12	8	1	3	.....	.....	.....
1916.....	9	5	.....	3	.....	.....	1
1917.....	12	7	2	1	1	.....	1
1918.....	9	5	1	2	.....	.....	1
1919.....	9	5	3	1	.....	.....	.....
1920.....	15	3	8	3	1	.....	.....
1921.....	20	6	7	6	1	.....	1
1922.....	28	12	9	6	.....	.....	.....
1923.....	20	4	11	5	.....	.....	.....
1924.....	25	6	12	5	1	.....	1
1925.....	11	1	5	4	1	.....	.....
1926.....	15	3	7	5	.....	.....	.....
1927.....	10	2	8	.....	.....	.....	.....
1928.....	1	.....	1	.....	.....	.....	.....
1929.....	4	1	2	1	.....	.....	.....
1930 to April 1st.....	222	82	77	49	6	3	5

*No steam turbine establishments were found in this group.

Similarly, of the 49 gas-engine plants changing to purchasing establishments, 63.2% changed in the period 1921-1926. Only five plants changed to purchasing all of their output in the two years 1928-29, three of which were oil-engine plants, one gas-engine and one a steam-engine station. It is significant that no steam-turbine plant has thus far changed to purchasing all of the current distributed.

⁴⁵ These still constitute instances of municipal ownership but the municipality does only a distributing business.

The economic forces already described affected the technical character of existing establishments in much the same way that they affected the arithmetical count of municipally owned plants. The movement from generating to purchasing was well started in 1915 to 1917, was temporarily halted in 1918 and 1919, and fully resumed by 1921 when private capital was again prepared to extend its service, with the peak of the movement coming in 1922. It may be noted that the rate of change from generating to purchasing has been declining since 1922, whereas the rate of change from municipal to private ownership of generating plants has been declining only since 1926.⁴⁶

Summary

Technological factors have sometimes aided and sometimes hindered the municipal ownership movement in this geographic division. In the period prior to 1910, private capital was concerned primarily with the development of internal economies in existing generating plants. The result was an intensive development of favorable markets, leaving municipal ownership to expand rapidly in numbers where private capital could not or would not provide the service. Steam engines were at that time the principal prime movers available to communities desiring to enter the business of electrical generation.

The period from 1910 to 1917 marks the beginning of active integration in the electric light and power industry. Private capital then interested itself in an extensive development of markets. It is not illogical to assume that in reaching out for new markets, the more attractive of these smaller publicly owned plants were the first to receive offers from

⁴⁶ The analysis of horsepower groups may provide a clue as to the reason for this difference.

privately owned utilities. Attractiveness, however, depended not so much on prime-mover equipment as on location and market with respect to the expansion program.

Our analysis indicates that the internal combustion engine, particularly the oil engine after 1912, added new life to the municipal ownership movement just at the time when the steam engine was contributing to its demise. The new technology of interconnection was not moving westward rapidly enough to satisfy the desire of all small communities for electric service. The internal combustion engine offered them the possibilities of that service and many of them accepted it. Furthermore, as obsolescence crept upon the steam-engine plant, the oil engine presented an alternative to complete abandonment. In many cases it eventually supplanted the steam equipment entirely.

In the East and East North Central sections of the country this oil-engine development got under way just in time to be caught in the transmission line network, but in the West North Central division it was strongly entrenched before the net was stretched. The war was doubtless one factor in delaying the extension of transmission lines into this territory. By 1922, however, the interconnection program was again speeded up. At this point we have to differentiate between the gas and the oil engine. The former evidently could not compete with the economies of a new technology, for its numerical decline has been precipitous since 1921, but the latter has shown a greater resistance to private acquisition.

The slowing up in the rate of total decline since 1927 may be significant. It may be that private capital has gone far enough (or perhaps even too far in some instances) in its extensive development of markets. The recent emphasis given to merchandising policies and improved rate structures lends color to such an hypothesis.

Further losses in municipal plants will doubtless accrue as the transmission line network is strengthened or spread but the experience of the first three months of 1930 may be an indication that vulnerable spots still exist in the system, for only one municipal plant was acquired by commercial interests in this division, whereas three new oil-engine plants began municipal operation. The experience of three months, however, can hardly be accepted as an indication of a distinct reversal in trend in municipal ownership. The difficulty of financing acquisitions since the summer of 1929 is probably the significant factor.

This numerical analysis of municipally owned generating plants merely points out the broad trends in prime-mover development and relates them to significant economic forces working in the various periods. The forces affecting the movement are so complex that it is impossible precisely to correlate cause and effect resulting from any one of them. We can only isolate the factors, weigh them quantitatively, and finally view them in relation to one another. It is proper, therefore, that the final interpretation should wait until the whole picture has been unveiled. The analysis of these plants by horsepower of prime movers will be presented in the second article.

NEW YORK STATE STUDIES REGULATION

By JOHN D. SUMNER

NEW YORK'S investigation of the adequacy of her public utilities law and its administration comes at an interesting juncture. Nearly a quarter century of commission regulation has elapsed since Wisconsin under Governor La Follette and New York under Governor Hughes, in 1907, inaugurated administrative commissions of the so-called "mandatory" type, possessed of fairly wide and substantial powers, and designed to insure adequate service at reasonable rates. Although there is wide variance among states, both as to the scope of jurisdiction and the character of powers granted, regulatory commissions now exist in all states but Delaware.

The past decade and a half has been critical in the history of regulation, and in the view of many, state commission control is being weighed in the balance. A combination of factors is severely testing the efficacy of state commission, and indeed of every type, of regulation. Full examination of these factors is not within the scope of this article, but attention should at least be directed to certain fundamental forces, which together have placed a severe strain upon existing machinery. Foremost of these forces, perhaps, is the revolution in general and individual commodity price levels which accompanied and followed the world war and which present signs indicate may not yet be completed. Rising prices have in many cases necessitated commission authorization of increased rates, always an embarrassing situation for a public body. Dollar production costs have undergone rapid changes and in doing so have made rate regulation, by the meth-

ods now generally attempted, a difficult if not an impossible accomplishment.

A closely allied difficulty has been enforcement under judicial review of the "present value" doctrine of the courts. While the logical fallacies of such a doctrine might be overlooked during a period of price stability, the administrative difficulties to which it has given rise during the past 15 years have been overwhelming. The quick progress of production technology has likewise produced a situation in which commissions have needed to be everlastingly alert to insure any sort of correspondence between rates and production costs, a circumstance notoriously true in the electric industry. Furthermore, the organization of the public utility industries is undergoing, we may nearly say has undergone, a change of far-reaching significance. The utility field technically and financially is ideally adapted to holding company control, with the result that commissions have confronted new problems, and in doing so have sometimes found themselves inadequately equipped for the task of regulation. Finally, changes in production organization and technology, particularly in the electric and communication industries, have united to make utilities increasingly interstate in character, and to necessitate either some form of joint action among states under the compact clause, or federal assumption of jurisdiction.

These and other circumstances have unquestionably impaired the efficiency of commission regulation and have led to widespread doubt not alone as to the efficacy of control under existing laws,

but as to the entire feasibility of commission regulation.¹

Special circumstances leading to the New York investigation are interesting: the well-known proposal of former Governor Smith for public ownership and development of undeveloped water power resources, subscribed to by Governor Roosevelt, his successor, has for some time focused attention in the Empire State on public utility problems; and in no state has the electric utility recently experienced a more rapid and spectacular reorganization than in New York.² The extent of holding company control in New York is evidenced by the fact that in 1928 the holding company groups controlled 98.5% of the kilowatt hours sold.³ The Public Service Commission of New York in its 1927 and 1928 *Reports* urged the need for adequate control of holding companies.⁴ Finally, such incidents as the long drawn-out New York Telephone rate case heightened public dissatisfaction and produced a spirit of criticism and doubt.

¹ Outward evidence of doubt and criticism is afforded by investigations initiated in 1929 by New York, Massachusetts and Wisconsin to determine the effectiveness of commission regulation under existing law and procedure; other states have considered doing likewise. In the national field the Federal Trade Commission has been busy with its investigations of the electric light and power industry; the Senate Interstate Commerce Committee has investigated the Federal Power Commission and has studied proposals for a federal communications and power commission.

² The Consolidated Gas-Brooklyn Edison combination in 1928; the creation of the Buffalo, Niagara and Eastern holding company in 1925; the paramount position assumed by the Niagara-Hudson combine in northern New York in 1929; and predicted combination of the Consolidated Gas and Niagara-Hudson groups are among the occurrences which have kept popular interest alive. Interesting, in view of current rumors of this last combination, is a statement in the report of Colonel Donovan, counsel of the investigating commission:

"The testimony of Mr. Sloan (5389-5402) indicates that the interconnection of the Niagara-Hudson system and the Consolidated Gas system would be economical and may be inevitable." (*Report, Commission on Revision of Public Service Commissions Law, Legislative Document, No. 75 (1930), p. 141.*

The New York legislature on April 16, 1929, passed the Thayer-Dunmore bill⁵ providing for the establishment of a commission to investigate proposed revisions of the public service commission law. It created a commission of nine members, three to be appointed by the Governor, three by the Assembly, and three by the Senate. This placed control of the commission with the Republicans of the legislature rather than with the Democratic governor as proposed in an earlier measure.⁶ The commissioners appointed were Senators Knight, Hickey, and Thayer; Assemblymen McGinnes, Stone, and Dunmore; and governor's appointees Adie, Bonbright, and Walsh. Mr. Adie had previously been appointed to the New York Public Service Commission by Governor Roosevelt but had not been confirmed; Mr. Bonbright is professor of finance at Columbia University and a well-known student of

	Kw. Hrs. Sold
Niagara-Hudson group.....	54.6%
Consolidated Gas group.....	34.8
Associated Gas & Electric Company group.....	7.6
Long Island Lighting Company group.....	1.2
All other holding groups.....	.3
	<hr/> 98.5

(*Ibid.*, p. 141).

⁴ Referred to in article by former Chairman Prendergast of the New York Public Service Commission, *New York Times*, March 3, 1929, Sec. 9, p. 7.

⁵ Laws of New York, 1929, Ch. 673, p. 1607.

⁶ An earlier measure, the Sheridan-Sargent bill, was introduced in February, 1929, and provided for a commission of five members, three of whom were to be appointed by the Governor (*New York Times*, February 21, 1929). This bill was followed by the Thayer-Dunmore bill, sponsored by the Republican leaders of the legislature (*New York Times*, February 26, 1929), which was the measure finally enacted. Governor Roosevelt, on March 25, 1929, specifically recommended the creation of an investigating commission (*New York Legislative Document No. 84 (1929)*). In view of the subsequent division in the investigating commission between legislative and gubernatorial appointees, this shift in control of commission membership from the governor to the legislature is particularly interesting.

public utility problems; Mr. Walsh is known as an attorney frequently representing labor organizations.⁷

The powers of the commission were ample to carry out the purposes of its creation, which were to make a thorough study of the public service commission laws of New York and other states, in order to ascertain the effectiveness of the New York law, to determine what amendments or revision seemed desirable, and to draft measures recommended for legislative enactment.⁸

The hearings were extensive and unusually worth while;⁹ and the final report of the commission¹⁰ was submitted on February 28, 1930. It contained some 500 pages and includes a majority report; a minority report, signed by commissioners Adie, Bonbright, and Walsh; a report by W. J. Donovan, Counsel; a suggested report by Senator Thayer; and, as an appendix, memoranda on public utilities in six foreign countries.¹¹

The following discussion of the reports is arranged topically, and, because of the length and substance of the reports and the limited space here available, is in no sense to be considered an adequate digest; it is necessarily limited to those features of the several portions of the document which to the reviewer seem most interesting and significant. For the most part the digest will be limited to the majority and minority reports; the report of counsel agrees sub-

stantially with and in most respects is apparently the basis of the majority report. It is important to note that the majority and minority reports agree substantially in all matters except: (1) recommendations dealing with the way in which the state-wide valuation which both recommend is to be used for purposes of rate control; (2) method of appointment of the People's Counsel; (3) certain phases of salary policy; (4) grade-crossing elimination; and (5) the question of municipal competition.

The points on which substantial agreement is reached are numerous, extremely significant, and by no means limited to petty matters. It may be noted, however, that the tone of the minority report, especially Part I,¹² is far more aggressive and condemnatory than is that of the majority, or even that of counsel. The minority feel, moreover, that the first point of disagreement—the plan for rate control—is extremely important. Indeed, they assert that, if the necessity of submitting to the "fair value" doctrine were to be indefinitely prolonged, they would be in favor of immediate steps toward government ownership.¹³

Views As To The Status of Regulation

One of the most interesting parts of the *Report* relates to the present health and condition of commission regulation in New York. As to the effectiveness of

⁷ The Commission was assisted throughout by a research staff, headed by W. E. Mosher, Director, School of Citizenship and Public Affairs, Syracuse University. The Commission counsel was Colonel William J. Donovan, former assistant attorney general of the United States.

⁸ Laws of New York, 1929, Ch. 673.

⁹ Witnesses included representatives of the public, municipalities and civic organizations, regulatory bodies in other states, public utilities, numerous well-known technical experts and advisers, and the members and staff of the public service commission. The hearings were comprehensive, the stenographic record covering 5,816 pages; 205 exhibits were filed.

¹⁰ Cited *supra*, n. 3.

¹¹ *Report*, p. 423, prepared by Professor O. C. Hormell of Bowdoin College.

¹² Part I of the minority report (p. 254) on the "General Problem of State Regulation" was prepared by Commissioner Walsh and its recommendations and conclusions concurred in by Commissioners Bonbright and Adie. Part II (p. 334) on the "Basis of Rate Control" was prepared by Commissioner Bonbright and concurred in as to conclusions and recommendations by Commissioners Walsh and Adie.

¹³ *Report*, p. 416.

commission regulation, the majority are mildly critical;¹⁴ the minority aggressively so.¹⁵

The majority and minority agree that the Commission has overestimated the judicial phase of its work to the detriment of its administrative functions; and that the commission has shown insufficient initiative in advancing the interest of consumers. The minority is outspoken:

"Not only has the commission failed to push the public interest aggressively, but it has openly taken the corporation attitude toward efforts of consumers to make their voice heard."¹⁶

The minority likewise condemn the utilities.¹⁷

"We find that the utilities themselves are chiefly responsible for this failure of regulation and that they have spent millions of dollars to thus free themselves from any limitation on their ability to charge what the traffic will bear, or, as they themselves put it, 'what business judgment dictates'."

The present-value doctrine of the courts, enforced by judicial review, is declared by majority and minority alike to constitute the fundamental bar to effective regulation.¹⁸ The report of the minority develops at length¹⁹ the point that overcapitalization, in the

sense of a capitalization larger than investment, has been largely replaced by a new form of overcapitalization of an equally vicious nature. This new overcapitalization is in fact *over-valuation*, and is fostered by the "present-value" doctrine of the courts which has often led to the absurdity of a "fair return" higher than most prosperous companies can earn.²⁰

Rate-Base and Rate of Return

This brings us to the subject on which there is at once the greatest accord and disagreement between the two reports. Each report, as above indicated, emphasizes the valuation problem as the crux of rate regulation. Each emphatically states the necessity of a stable rate-base. Finally, both recommendations call for a complete valuation of utility properties, other than steam and street railways,²¹ on the basis of the so-called "law of the land" (as respects valuation), thus giving substantial and perhaps major weight to the cost of reproducing the identical plant, less observed depreciation. From then on, however, the two reports are at loggerheads.

The majority recommendation is the less far-reaching of the two. It provides:²² (1) that all existing properties, except

¹⁴ Say the majority, "It is . . . our belief that the record does not justify the deduction that regulation through the Public Service Commission has failed. We are ready to admit that the Commission, like other human institutions, may be improved . . ." (*Ibid.*, p. 15).

¹⁵ In that portion of the minority report prepared by Commissioner Walsh appears the following: "On the basis of this intensive investigation, we find that effective public utility regulation has broken down," and, to make matters emphatic, the added assertion—"and that the consumers of the State have been abandoned to the exploitation of the public utility companies without any effective restraint by the Public Service Commission." (*Ibid.*, p. 258.)

¹⁶ *Report*, p. 302-303.

¹⁷ *Ibid.*, p. 258.

¹⁸ Say the majority (p. 16): "Its decisions [the Supreme Court's] taken all together lay the ground for methods of determining values that permit of a great variety of interpretation and emphases"; and later (p. 17) "Effective regulation requires a definite rate-base and one that will not be subject to more or less continuous variation."

The minority report contains the following (p. 53): "Truly effective regulation will be impossible as long as there prevails in this State the rule that the so-called 'value of the property,' as determined by the court, shall be the basis of rate control."

¹⁹ *Ibid.*, pp. 273-284.

²⁰ *Ibid.*, pp. 351-2.

²¹ Steam railroads are excluded because of the dominant position of federal control; street railways, because their inability to earn any sort of satisfactory return makes valuation little more than an "academic" problem.

²² See *Report*, p. 16, et. seq.

as above noted, shall be valued by the Commission according to the "law of the land;" (2) that on the basis of such valuations the Commission be authorized to enter into contractual rate-agreements with the companies, *if the latter so desire*, these contracts to run 10 years; (3) during the 10-year period *future investments are to be added* to the initial valuation "according to the amount actually expended and approved," rate-regulation during the period to be accomplished through accounting control; (4) at the end of the 10-year period the valuations are subject to revision and new contracts may be made; (5) in case a utility is unwilling to enter into such an agreement, "the Commission shall use the initial valuation and keep them up to date according to accepted methods."

The majority plan is clearly an attempt to secure some degree of rate-base stability without enacting a plan which is contrary to the valuation doctrines of the Supreme Court.

The minority propose the enactment of a comparatively revolutionary policy.²³ A valuation of existing properties is to be made by the same methods advocated by the majority. Instead of optional short-term contracts, however, this proposal calls for a mandatory enforcement of rate-regulation on the basis of the initial valuation, kept up to date by adding subsequent additions to plant at cost, less the book values of properties withdrawn from service, and the amount

in the depreciation reserve.²⁴ The minority, chiefly with a view to bolstering the constitutionality of their proposal,²⁵ introduce a 25-year contract plan as an optional measure. Thus, if a company elects, it may choose the new type of regulation for a trial period; at the end of this period the public may purchase the property for the then "value" of the rate-base which has been computed as outlined above. The minority emphasize that they do not believe that an optional contract can be made effective unless accompanied by the mandatory provisions of the statute.

Rate of Return. Before analyzing the alleged merits and demerits of the above plans the majority and minority views for control of the rate of return should be outlined, inasmuch as the rate of return is essentially a part of the valuation problem. Control of the rate of return happens to be particularly important in New York State because of the high proportion of hydro-electric generation, actual and prospective. Hydro generation ordinarily results in an unusually slow rate of capital turnover, and the proportion of capital costs to total costs of production becomes relatively high. This fact places even small variations in the rate of return in a significant relation to rates charged consumers. Furthermore, the policy of the New York Commission has been extremely liberal to the utilities in the matter of return and has ordinarily permitted a rate of return of 8%.²⁶ Both majority and minority

²³ *Ibid.*, pp. 53-55, and the main minority report, Part II, pp. 250-3, 334 *et seq.*

²⁴ Depreciation is to be provided for by ample depreciation allowances which "shall include all causes which reduce the service life of the property" (p. 415). The amount of the reserve may be reinvested in the property of the utility, but "the amount of this reserve shall be deducted from the book values of the corporate assets in the determination of the rate-base" (p. 395). This is apparently subscribed to by the majority plan as well (pp. 22, 24). This prevents the con-

sumer from having not only to contribute adequate depreciation reserves but to pay a "fair return" upon the amounts so contributed, as is now sometimes the result.

²⁵ *Ibid.*, p. 402.

²⁶ As quoted by Commissioner Bonbright, (pp. 365-366) from memorandum prepared by New York Public Service Commission, the returns allowed in the 42 cases involving the determination of a rate of return, between January, 1916, and November, 1929, follow:

(Footnote 26 continued on page 263)

reports criticized the Commission for undue liberality.

The majority plan²⁷ provides that in case of a contract, the rate of return on the *initial valuation* shall be agreed upon by the Commission and the companies concerned. For *future investments* the rate

"shall be fixed for bonds and preferred stock at the market price received from the purchaser and . . . for common stocks the Public Service Commission and the companies shall agree upon a reasonable rate of return necessary to attract new capital, with proper allowances for amortization of discount and premiums. In the matter of additions paid for through the issuance of common stock and out of earnings distributable as interest or dividends, an agreed rate fixed in the contract would be applied to the total amount of such equity or investment. It is assumed that such a rate would not exceed eight per cent."

For companies which do not enter into contractual agreements the above method is to be followed "so far as possible as a guide." The majority accept the principle of a "rate equalization reserve," discussed later with the minority plan.

The proposal of the minority²⁸ provides that the Commission shall determine a rate of return on the initial valuation of each company, giving consideration to the

"size and type of property, the financial standing of the company, the actual costs recently incurred by the company in securing

(Footnote 26 continued from page 262)

Type of Company	8%	7% Plus	7%	6% Plus	6%
Electric property 11	1				1
Gas property 10	2	2			1
Natural gas property . . 4					
Telephone property . . . 2		2			
Street railway property 3		2	2		

It will be noted that in this table there are 43 cases rather than 42, as stated in the discussion quoted. Bonbright states (p. 366) that information concerning the lower return to street railways indicates that these returns are a recognition by the Commission that the industry could not earn more. As to gas companies, he

capital, and all other relevant data, taking into consideration the fact that the rate of return on the initial valuation, when once fixed, shall not be subject to later fluctuation" [except upon retirement of securities].²⁹

For additional investments, made through the issuance of notes, bonds and preferred stocks, the minority plan coincides substantially with that of the majority. For additional investments made through the issuance of *common stock*, however, there may be some doubt as to what is intended. To quote (p. 416):

"the Commission shall fix the return on each issue: [i. e., of common stock] at a rate sufficient to attract the needed capital to the public service, and it shall base the rate for each addition upon the amount of capital actually contributed and not upon the par value or stated value of the shares; provided, however, that if the capital structure of the company (including the common stock) is brought into harmony with the rate-base, and if stated dividends are fixed upon the common stock, then the return thereon may be determined in the same manner as upon the preferred stock. With respect to the investments made out of [distributable] net earnings . . . the rate of return shall be determined . . . as upon the issuance of common stock. When once determined, the return applicable on each security issue, or on each reinvestment of earnings, shall not be subject to change, except as provided . . . with respect to the refunding or retirement of security issues."

Considered with statements elsewhere,³⁰ the reviewer interprets this

cites two cases in support of the following statement (p. 366): "the departures from the standardized allowance of eight per cent, seen to have been due to special circumstances, notably to the fact that in certain instances the property was overdeveloped relative to existing demand for the service."

²⁷ *Ibid.*, pp. 22-24.

²⁸ *Ibid.*, pp. 395-399, 415-417.

²⁹ See *Ibid.*, pp. 415, 416, for details.

³⁰ *Ibid.*, pp. 396-97 "For funds secured by common stock, . . . the Public Service Commission shall determine a reasonable rate of return to be allowed on the funds that will be secured by the proposed stock issue. This determination shall be made prior to the issuance of the stock, so that the company as well as prospective new investors may know in advance just what rate of return the new capital will be entitled to earn."

to mean the earmarking of each issue of common stock, and the allowance for all time of a fixed return thereon so calculated as to attract the necessary capital. This is perhaps not the correct interpretation, however, for no place has been discovered in which the minority assert that the return on such additional common stock shall be absolutely and permanently fixed. Other provisions cover the retirement of indebtedness.³¹

Corporate earnings and rates, as contemplated by the minority, are to be stabilized³² by means of two measures, the first being a "rate equalization reserve," the principle of which is endorsed also by the majority. This device contemplates the establishment over a period of 10 years of a reserve equal to approximately 20% of the rate-base,³³ to which all earnings in excess of the stipulated rate of return, and deficiencies thereof, shall be credited or debited. In case the balance in the reserve at any time falls below 5% of the rate-base, rates are to be promptly raised if this is commercially feasible.³⁴

It should be noted that the assets represented by this equalization reserve, while they may serve to bolster the financial strength of the company and to add to its capacity for service, are to be considered a customer's equity account so far as the rate-base is concerned.

The second stabilizing device is "a clause giving a public utility company

the right to make good in any one year any deficit below a fair return incurred during the three preceding years." Taken together, these two measures afford more than liberal safeguards to utility credit.³⁵

The valuation and rate of return provisions of the majority report, it has been noted, embody substantially the principles contained in the minority provisions so carefully prepared by Commissioner Bonbright. The general plan of both reports is similar to that advanced recently by Dr. John Bauer,³⁶ although the minority report has changed and elaborated the general outline of the Bauer proposal with great care.

Discussion of the Two Plans. Of the majority plan the best that can be said, in the reviewer's opinion, is that it frankly recognizes the grave defects of present regulatory methods, and seeks a way out.

The plan proposed, however, is subject to two major criticisms, in addition to certain of those later discussed in connection with the minority report. First is the fact that the proposed contracts between the commission and the utilities are to be of 10 years' duration only. At the end of each such period the entire matter must be solved over again, thus making of regulation a Sisyphean task. Secondly, the contracts proposed are optional with the utilities. The position now enjoyed by those portions of the utility industry in which regulation is "ineffective" is enviable indeed.³⁷

maintain approximately a 20% reserve." The economic impossibility of achieving this goal in all cases is, of course, recognized.

³¹ In case a public utility elects the 25-year contract option of the minority plan, the rate of return is to be controlled by the provisions of the mandatory plan (see p. 419).

³² John Bauer, *Effective Regulation of Public Utilities* (New York: MacMillan, 1925).

³³ An exhibit prepared by the Public Service Commission is quoted (*Report*, p. 288) to show that of 75 electric properties in 1928, 56, or about 75%, earned more than

(Footnote 37 continued on page 265)

³¹ See proposed statute, *Ibid.*, pp. 416-417.

³² See pp. 397-9, 417 for detailed minority plan; p. 24 for majority.

³³ Compare the 5% reserve provided for stabilization of railroad earnings by the Esch-Cummins Act of 1920.

³⁴ Commissioner Bonbright states (*Report*, p. 398) that the so-called "automatic" type of rate equalization reserve employed in service-at-cost franchises was considered. Such reserves contain specified maximum and minimum limits, such as 5%-20%. He considers it advisable, however, merely to direct a general policy of "sanctioning such rates as will build up and

Furthermore, the evidence cited in the published reports shows a strong disposition on the part of the companies to insist upon the protection of judicial guarantees. As stated by the president of the Consolidated Gas Company with reference to the contract plan,³⁸ "with every desire to cooperate reasonably in every forward step in utility management and regulation, we feel that these matters of valuation and return will preferably and necessarily be left with the Courts." All things considered, it seems foolish optimism to expect the utility companies voluntarily to depart materially from their present position, which seems to be one of hostility toward the valuation and rate-of-return proposals of both the majority and minority.

It would seem, therefore, that the majority proposal, as respects valuation and the rate of return, does not afford much ground for expecting any material improvement over existing conditions in these phases of regulation. At the same time, it is open to some of the same criticisms which may be made of the minority proposals, to which we now turn.

The chief criticism, perhaps, that may be brought against the definite proposals for stabilization embodied in the minority, and to some extent in the majority, plan is that the fixation of the rate-base and rate of return may produce managerial stagnation. A cardinal virtue attributed to private, as opposed to governmentally conducted, enterprises is the superior initiative, ingenuity, and progressive spirit allegedly possessed by the former. Presumably

the mainspring of this initiative under a system of private enterprise is largely the profits motive.

If regulation were really to be made "effective," the question of incentives would certainly constitute one of the most difficult problems to be solved. The merit of this point of view is conceded by Commissioner Bonbright, who remarks³⁹ that it provides in his mind "the only truly serious economic objection to the actual cost rate-base;" and, he might have added, to the proposals for control of the rate of return.

To meet this admittedly important doubt as to adequacy of incentives to managerial efficiency, the minority, and the majority to a lesser extent, make certain recommendations concerning the powers and duties of the Public Service Commission and offer certain defenses of the position taken. Briefly listed these suggestions are: (1) both reports⁴⁰ urge that the commission be directed to study the desirability of possible methods of flexing the rate of return so as to achieve a system of awards and penalties, such as "a sliding scale of dividends" in connection with some "merit-rating" scheme, or, as Commissioner Bonbright suggests, flexible dividends to all voting common stock and perhaps to a new, special class of management stock;⁴¹ the minority further suggest (2) that the utility commission (see p. 420) be given wide powers over practically all phases of operation, in order that it may not only check uneconomic expenditures and unreasonable contracts with affiliated companies, but may require competitive bidding and joint use of facilities, and may order any

(Footnote 37 continued from page 264)

8% on fixed and working capital, computed by data in possession of the Commission. Companies earning more than 9% numbered 46; 34 earned more than 10%; 30 earned more than 12%; while 15 received a return of more than 15%. Ten companies earned more than 20%

on the basis of this computation, which, of course, is not the legal rate-base of the companies.

³⁸ Quoted, *Ibid.*, p. 263, from p. 5,009 of the Hearings.

³⁹ *Ibid.*, p. 383.

⁴⁰ *Ibid.*, pp. 24, 386, 421.

⁴¹ *Ibid.*, pp. 386.

improvements or changes in operation deemed desirable in the public interest; (3) commission negotiation of agreements for division of economies of consolidations between companies and consumers⁴² (4) that the rate-base and depreciation provisions proposed will remove the present inducement to retain obsolete equipment in the property account.⁴³

In addition to the above recommendations the minority defended their rate-base and rate-of-return proposals on the score of efficiency incentives by pointing out these ways in which efficient management might be promoted: (1) enhancement of market values of stock with improvements in credit rating would rebound to stockholders both through increased market values of securities and through issuance of valuable subscription rights;⁴⁴ (2) issuance of such rights would be encouraged by an accelerated demand for capital to finance additions stimulated by the increased demand flowing from reduced rates;⁴⁵ (3) the profits motive when restrained, will increasingly give way to "pride of workmanship" and a "feeling of public spirit," a tendency which can be encouraged among public utility managers by regarding them as public agents and perhaps by a special class of managerial stock.⁴⁶

Nevertheless, the minority admits that "in the time at our disposal, it has been quite impossible for us to come to any definite conclusions as to whether a differential rate of return, . . . ought to be allowed, and as to how this rate should be measured, even assuming that it is desirable as a matter of principle."⁴⁷

Taken together, the points outlined above certainly make it impossible to charge that the minority plan, or that of the majority in so far as it might be effective at all, takes away all incentives to efficient and progressive utility management. And in the absence of more definite knowledge of this little studied problem the weighting of the arguments advanced is probably more a matter of opinion than anything else. Even so, certain major criticisms of the position taken seem justified.

The minority suggested that uneconomical operation and construction may be checked by placing positive, as well as restraining, powers in the hands of the Public Service Commission. Waiving the legality of such complete control of managerial functions, such measures can be no more than palliatives. If such public control could secure all the efficiency presumably achieved by motivated private management, it would be better to recommend public ownership; if it cannot be so successful, then the proposal seems a confession of the inadequacies of other incentives.

Whether or not one agrees with the statement that the profits motive is no longer even the "primary" force to be relied upon in securing adequate utility management depends upon his confidence in human nature. It is somewhat difficult, however, to reconcile this view of utility management and of the forces motivating it with certain other portions of the minority report.⁴⁸

In considering the method proposed for control of the rate of return, the

⁴² *Ibid.*, pp. 386-388, 422.

⁴³ *Ibid.*, pp. 385-386.

⁴⁴ *Ibid.*, p. 384.

⁴⁵ *Ibid.*, p. 384.

⁴⁶ *Ibid.*, pp. 384-385. See this point as developed by C. S. Morgan, *Regulation and the Management of Public Utilities* (Boston: Houghton-Mifflin, 1923).

⁴⁷ *Report.*, p. 386.

⁴⁸ See, for example, Commissioner Bonbright's denunciation of the duplicity of the "management," not the stockholders, of the American Telephone and Telegraph Company in the depreciation controversy, where it is alleged the Company broke faith with a pledge of its former president, Mr. Vail (*Report*, pp. 353-354).

reviewer, as previously noted,⁴⁹ does not feel certain just how rigid it is intended that the rate of return should be on new investments secured through the issuance of common stock. If it is contemplated that each subsequent addition to capital secured by common stock issues is to be earmarked, and a separate rate of return paid on various portions of the common stock, then two undesirable results are achieved: (1) there are serious practical difficulties to a variety of rates of return on various portions of the voting common stock; and (2) the rate of return would be placed in an absolute strait-jacket until such time as the Public Service Commission devised some flexible or differential type of return, and the legislature approved it through an amendment to the public utilities law. This seems an unwise policy to adopt.

If, on the other hand, it is intended that the rate of return on new investments represented by common stock shall be the same on all such additional investments, then the faults are perhaps not so serious. Even here, however, if the return were not held constant for all time but were varied with future changes in the cost of such capital to the company, the circumstance is presented of already existing shareholders benefiting from rising capital costs (which might reflect managerial inefficiencies) and being penalized by lowering costs of such new equity capital.

Perhaps some plan between these two interpretations is intended by the minority; if so, it is by no means clear. Of the two interpretations the former seems to the reviewer the one intended.

If so drastic a plan were necessary, it might perhaps be preferred to a continuance of present methods. However, in the opinion of the reviewer,

choice is not so limited. Rate-base stability and substantial stability in the rate of return may be achieved, certainly to the extent of removing excessive gains, without going to the extent of complete or nearly complete rigidity of the return as an immediate step. A comparatively stable rate-of-return policy may be employed while still permitting some flexibility among various portions of the capital structure in order to secure to common stockholders a more substantial portion of the gains to be derived from a superior credit rating, or careful planning of construction and financing programs than would be possible under the minority proposals. As the minority themselves allege, the Public Service Commission under the present system has never given adequate study to the rate-of-return problem. If it did so, and arrived at a rate of return having some basis in fact, and employed that rate of return in conjunction with a stable rate-base, the results certainly would not involve the major disadvantages of the present situation, nor would they be so open to the serious criticisms which may be levied against the provisions for incentives contained in the plan and urged as a first step.

Some such measure of moderation might better be the plan first to be adopted with provision that the Public Service Commission study the possibilities of a carefully worked out system of awards and penalties, and the extent to which the rigidity and certainty of the minority plan may safely be applied.

Substitute Methods of Control

The minority report⁵⁰ contains an interesting analysis of possible substitute methods of rate control. There is a brief discussion of the cost of reproducing the

⁴⁹ See above, p. 263.

⁵⁰ Report., pp. 371-77, and see *Report of Counsel*, pp. 92-100.

service as a basis of rate control, with respect to which Bonbright remarks:⁵¹

"... the cost of reproducing the service is the only kind of reproduction cost that has even a plausible defense in economic theory. Indeed, were it not for the very serious practical and legal difficulties of enforcing such a standard, we should be compelled to give it very close consideration as it has certain distinct advantages over any alternative basis of regulation."

There is also discussion and severe criticism of the views of the late President Hadley,⁵² who testified before the Commission, advocating that rate-making be left to the initiative of private management. Regulatory interference, according to President Hadley, is to be justified only when company management is too unintelligent to realize the point of highest profit is to be found by reducing rather than increasing rates. This theory of competitive regulation of public utility rates has recently come quite into favor in certain quarters.⁵³ Commissioner Bonbright analyzes this point of view at some length, and recognizes its part truth. However, he remarks:⁵⁴

"All of these [competitive] factors. . . . operate to prevent a company from charging as much as it would otherwise be disposed to charge; they do not operate to prevent it from charging any more than it needs to charge in order to perform the service and to attract necessary capital for extensions and improvements."

⁵¹ *Ibid.*, p. 372.

⁵² *Ibid.*, pp. 374-377.

⁵³ See Philip Cabot, "Ethics and Politics", 142 *Atlantic Monthly* 686 (November, 1928) and "Public Utility Rate Regulation," 7 *Harvard Business Review* 257, 413 (1929). For a criticism of Professor Cabot's view see H. M. Gray, "Competition as a Basis for Electric Light and Power Rates," 5 *Journal of Land & Public Utility Economics* 242-248 (August, 1929).

⁵⁴ *Report*, p. 375.

⁵⁵ The majority, however, seems also to feel that the minority plan as applied to existing properties would be unfair both to investors and consumers (pp. 18-26). It is not altogether clear just how far the majority really would agree as to the economic desirability of the

It is likewise pointed out that, by means of "promotional" and "inducement" rates, utility managements have devised a means of charging a higher rate for that portion of the service which will bear it, while at the same time offering a lower rate to secure the more elastic, luxury portion of the demand.

Constitutionality of Minority Plan

The constitutionality of the mandatory rate-base and rate-of-return proposals advanced by the minority was apparently the principal cause of disagreement between them and the majority.⁵⁵ This discussion will not attempt to do more than indicate the general position taken by the opposing groups.

The mandatory portion of the minority plan is admittedly subject to the greater doubt concerning constitutionality, the optional 25-year contract feature of the proposal occasioning less concern.⁵⁶ The majority advance four arguments against the mandatory features of the bill:⁵⁷ first, it is asserted that the minority plan proposes too abrupt a break with the past, and that the "acceptance of its provisions either by the Legislature or the Supreme Court must depend upon a preliminary period of

minority proposal. They content themselves largely with an attack on its constitutionality.

⁵⁶ The only serious question there raised is considered to be the authority of the legislature, under the New York constitution, to restrict its police power through contract, and counsel is cited as believing that the plan is in accordance with the state constitution. Little doubt is entertained as to the legality of the plan under the Federal Constitution. See note in 30 *Columbia Law Review* 527 (May, 1930) for a discussion of "Enforceability of Contracts Fixing Public Utility Rates," which takes a favorable position concerning the constitutionality of the fixation of the rate-base by contract.

The contract option was introduced by the minority in order (*Report*, p. 402) to bolster the constitutionality of their mandatory proposals and to give added assurance to investors that the Public Service Commission law will not be changed during the term of the contract in any way that will impair their return.

⁵⁷ *Ibid.*, pp. 18-21.

education." Secondly, it is felt that the 14th Amendment will remain an insuperable difficulty to its operation. Again, the majority argue from expediency that even if there were some doubt as to the constitutionality of the plan, its adoption would be unwise because of the possibility of prolonged litigation. Finally, it is asserted that the plan would involve an unconstitutional suspension of the police power of the state.

In support of the minority views⁵⁸ Commissioner Bonbright answers the charge that the Supreme Court would not permit a departure from its "present value" doctrine, by arguing that the statute would present an issue on which the Court has never passed, and that a forthright legislative declaration of new policy would carry much more weight than would the attempt of a commission to restrict the application of the "law of the land" at its own discretion.

Furthermore, it is pointed out that the plan avoids any retroactive injustice, by arriving at a valuation of present property on the basis of present court doctrine, and that inasmuch as the Legislature rather than the Commission is to inaugurate the plan, assurance is given that the policy will not be changed in the future to the detriment of the utilities.

Finally the minority assert⁵⁹ that "if the necessity of submitting indefinitely to the 'fair value' standard were to be assumed, we should be ready to recommend . . . the immediate adoption of a policy looking toward governmental ownership of the utilities of New York State."

In rebuttal the majority argue,⁶⁰ first, that the economic arguments in favor of

the original cost as opposed to the reproduction cost theory have been frequently advanced before the court, e. g., by the Interstate Commerce Commission, but that the court has consistently repudiated the former doctrine. Second, the theory that a declared legislative policy will receive more favorable treatment at the hands of the Supreme Court brings forth the comment that no "legislative fiat can deprive a utility of a reasonable return upon the fair value of the property which is devoted to the public service at the time the inquiry is made." Furthermore, "if the court had in mind that this test of constitutional rights were to be applied only in the absence of a state statute it would have said so."

Neither side of the points at issue is presented at all conclusively nor, for that matter, could they be. The analysis of the minority seems logically superior to that of the majority, but the nature of the question is such that even the most thorough analysis could not resolve grave doubts as to the final action of the Supreme Court, if the plan were brought before it. The dogmatic assertion, however, that the minority plan is unconstitutional is plainly unjustified.

A large number of other important changes in the public service commission law of New York are recommended by both the majority and minority reports. The most important of these will be described in the next issue of the *Journal*, and the resulting action taken by the Legislature will be indicated.

Service Commission Law and its Constitutionality." See also R. L. Hale, "The Courts and the Attraction of Capital," p. 96; and R. F. LeBoeuf, "The Contract Method," p. 90, 14 *Proceedings of the Academy of Political Science*, No. 1 (May, 1930).

⁵⁸ Report, p. 410.

⁶⁰ *Ibid.*, pp. 18-21.

⁵⁸ Report, pp. 403-10 for discussion. A valuable analysis which reaches a generally optimistic conclusion as to the constitutionality of the plan is contained in 30 *Columbia Law Review* 548 on the "Bauer-Bonbright Proposal for the Revision of the New York Public

POPULATION AND PEAK LAND VALUES IN BUSINESS DISTRICTS

By H. MORTON BODFISH

THERE are two places in a city where changes in land values are most dramatic—at the edge of a city where land is first coming into urban use and in the central business district. For this reason these two districts are watched closely and are widely discussed as barometers or indicators of the general movement of land prices for the whole area. Theoretically in a city with unimpeded growth, a radial profile of land values would grade evenly downward from center to margin with a few hills in the form of outlying business and recreation centers.

Value changes are manifestations of several factors. In the past land values have been discussed largely in terms of growth of population. Obviously, if numbers alone are considered, one would find the highest land values in China, the slum districts, or possibly even on the site of a state penitentiary. However, numbers of people usually indicate a certain purchasing capacity. Thus, people of a certain type have consumption habits which give rise to trading and they also occupy portions of land; the relation of the two factors is important. Consequently, any additions to population usually mean additional demand for land. Of course, changes in the technique of housing, the multi-family trend, or doubling-up in depression periods, all tend to modify the above generalization. But the value significance of increased population is obvious. It also explains why the Realtor

"whoops" so much about population figures. The proposition regarding population and value has been stated as follows:

"As population increases land values usually increase in the aggregate, although they may remain stationary or decline in some areas. The increases caused by concentration of population are dependent primarily on the character and buying power of the people, and secondarily on the high costs of development of public and private improvements incidental to the concentration. The cost of development, in creating business opportunities and improving transit and transportation facilities, together with the purchasing power of the population, rather than mere increase of population in itself, increases values."¹

Since growth in typical American cities does imply fairly typical population character, buying power, and production costs of land and subsidiary services, a study of land-value phenomena as a relation of price to mere numbers is worth while.

The importance of the cost of production of land should be emphasized. All too frequently in the past have economists, following the Ricardian analysis, and lay thinkers, goaded on by the single taxer and the real estate promoter, looked upon land prices entirely from the demand side, except in appraisal procedure. The logic is unassailable when one reasons that an increase in population permits the "landlords . . . to reap where they never sowed."² Granted that striking instances of land increment can be found, a rigorous analysis of the value performance of land held for a

¹ *Regional Survey of New York and Its Environs*, Volume II (New York: Regional Plan of New York and Its Environs, 1929), p. 133.

² Adam Smith, *Wealth of Nations*, Bk. I, Ch. VI.

considerable period of time, especially if held vacant, does not show the returns so frequently called "unearned increment." The pioneers in agriculture, our present farmers, and subdivision lot purchasers can give dramatic testimony regarding the cost side of land values. This emphasis on costs is one of the notable contributions of that pioneer and master in land problems, Dr. Richard T. Ely. His theory of ripening costs and objective studies of costs have given a new orientation to the problem of land values,³ while many other economists have contented themselves with merely repeating the Ricardian logic. We must, however, state our belief that Professor Ely's writings bear a little too far and emphasize too much the personal investment qualities of land in contrast with its relation to the development of the theory of the distribution of wealth. From the point of view of distribution, there are increments in land values. They are not typical experience; generalizations concerning them must be qualified at every turn.

One study indicates a lack of relationship between rate of growth of population and rate of increase in land values in general. Residential values were found to remain more or less stationary as population increased; industrial val-

ues increased at about the same rate as the growth of the city; and business values rose more rapidly than the average for the city as a whole.⁴ In the present study the approach to the problem of peak values is not historical; the study is merely an attempt to bring together some prices and populations in a number of cities. Nor does it assume that because "Middletown" with 50,000 people today has a peak business value of x dollars, it will have front-foot values twice as high when its population has doubled, or its front-foot values then will be the same as those of another city with twice the population.

The recent sales of central district property so frequently discussed by real estate men have suggested that the "highest-value transaction" usually is the guide to the location or movement of the "hundred per cent. district;"⁵ in other words, the sale or peak value is regarded as indicating the trend of the valuable business property. The interest evidenced by practitioners and the curiosity of the author caused him to assemble data on peak sales and population.⁶

The author has long felt that the collection of fairly accurate information in the business field and interpretation thereof were desirable, even though all requirements of scientific accuracy could not be met. After all, value and value

³ See Richard T. Ely, *Outlines of Economics* (New York: Macmillan Co., 1930), 5th ed., ch. xxii; "Land Income," 43 *Political Science Quarterly* 408-427 (September, 1928).

⁴ Arthur J. Mertz, "Land Values and Population," 2 *Journal of Land & Public Utility Economics* 343-354 (July, 1926).

⁵ The so-called "hundred per cent. district" is a designation familiar to all real estate men. It refers to the one to four or five blocks of frontage in which the best retail shopping facilities are located; in other words, the "dry-goods" area with the surrounding business section which also pays peak rents or owns the high-value frontage.

⁶ To the knowledge of the writer there has been little study or discussion of the relation of peak-district, front-foot values to population. (Hurd is referred to in

the text.) In 1924, in a talk before the Rochester Real Estate Board, Mr. Cuthbert E. Reeves suggested that the best value of the most desirable, retail-district frontage could be approximated by applying a unit of 3 cents to the population of the city. He later found that this did not work in cities of a million or more. He suggested the following formula tentatively: \$1,000, times the square root of the population, divided by 3,000. This formula introduces a modification which varies as the square root of the divided population figure.

Other materials bearing on this subject may be found in: *National Real Estate Journal*, July 26, 1926, p. 46; *Spokane Daily Chronicle*, May 27, 1927; Richard M. Hurd, *Principles of City Land Values* (New York: Record and Guide, 1903); R. F. Bingham and Stanley L. McMichael, *City Growth Essentials* (Cleveland: McMichael Publishing Organization, 1928).

changes are products of human behavior and attitudes which are not susceptible of quantitative measurement other than by prices paid in the market place.

Materials and Sources

The materials used have been obtained entirely through conversation, correspondence, and personal inquiry in the cities included, when occasion permitted. Where possible, the values have been checked with more than one source. The limitations of the data are admitted. The author has carefully attempted to eliminate front-foot values based upon low capitalization rates, leases or ground-floor values implied from unusually fruitful store leases. An approach to calculating front-foot values from store rentals would be about as follows, taking an illustration from a city with which the writer is familiar: The ground-floor space in buildings in the 100% area, store rooms 50 feet to 60 feet in depth in first class buildings, is renting around \$40.00 front-foot value per month. Deeper stores up to 150 feet rent as high as \$50.00. After deducting taxes, insurance, maintenance, depreciation (recapture of capital invested in building), and allowing 7% interest on the capital invested in the structure, the residual revenue will pay 6% on a valuation of approximately \$45,000 per front foot.

While frankly admitting that some of the values used here may not be the deductive "willing-buyer-and-willing-seller" figures, nor even an exact measure of "economic rent based upon superiority of location only," they are as accurate as are obtainable from business

men who are giving their full time and attention to such matters. Obviously, size, shape, area, location, and utilization of the sites are left too much to the imagination to use the values obtained for appraisal purposes in front-foot valuations, or for a so-called best typical depth in the 100% retail shopping district. Most of the values are applied to lots of fair size or the prevailing figure in the very best portion of the district. The front-foot valuations are in the main for inside lots. In other words, corner influence is avoided where possible.⁷ Maximum or minimum depths were eliminated unless the transaction was for a legitimate and extensive improvement. For example, a "squeeze" lease in one of our largest cities set a value which will not be approximated by a block of the whole city even though its population doubles. Such data were eliminated.

It has been suggested that in utilizing front-foot prices a qualification for the character of the transaction should be inserted. For example, it was suggested that in communities with a large percentage of financing (credit) transactions, land values are higher than in communities where transactions are closer to a commodity or money basis. Probably so, but how are we to ascertain the price which would have prevailed if the buyer had purchased a site outright as contrasted with a purchase on an annual rental basis, i. e., a long-term lease? An element of credit is involved in practically every large-unit transaction today. The extent to which the cost and risk of this credit are written into the

⁷ Elimination of corner influence is difficult in many cases. In the author's opinion corner-influence tables are deceptive since they are primarily tax assessors' tools rather than the materials used by those who are really betting their own dollars on "the highest and best use of the land." Some front-foot figures are bound to include corner influence. For example, the blocks in

the central business district of Portland, Oregon, are only 200-feet square and all property is affected by corner influence; hence the front-foot measure of value used in other cities is not generally applicable there. Holdings are usually divided into 100 x 100-foot corner quarter blocks. The best corners today are valued at \$1,000,000 each.

total consideration cannot be determined accurately. In this broad study, as previously indicated, front-foot values based upon fantastic or extremely unusual store leases have not been included.

The population figures are obtained from statements by individuals in the community checked against available census estimates. The population figures given are for the economic or metropolitan area of the several cities since the whole area of influence causes the peak business values to be what they are. Data on population were obtained from several sources. The latest city estimates were used where obtainable and where they checked approximately with actual counts. In some cases the 1927 and 1926 Bureau of the Census estimates were used and several of the very small cities have the 1920 Census figure. More of the figures given, however, are current population estimates verified from several sources.

Neither actual front-foot values nor actual population figures are given here. The exact figures for the 209 cities are incidental to the main purpose of showing the general relationship between numbers of people and peak business values.⁸

Analysis of the Chart

The accompanying chart is not a statistical presentation with Pearsonian coefficients, measures of dispersion, and

the like. Frankly, it is a picture of some interesting information; it is merely an array in the order of size of cities, and the related facts are shown in the order determined by population alone.⁹

The Curves. The five curves require only brief explanation. The population curve merely attempts to show the changing size of city from the largest to the smallest; it is of no other significance. The primary purpose of the curve is to permit the reader or appraiser to ascertain the approximate population used for each city. Because of the wide range in city sizes and the space limits of the chart it was necessary to discontinue the curve for the six cities of more than 1,000,000 population and merely to list them with their approximate populations.

Two curves depict the ratio between gross population and peak business value in the several cities. This is referred to as the per-capita front-foot value. The heavy solid ratio curve is a 5-point moving average of the actual ratios. A moving average merely assists one in observing the trend in a series of figures. It would be possible to draw a line free-hand through the population-value ratios which would show the tendency of the principal unit front-foot values to decline as the cities become larger. The moving average is a more accurate device for picturing this trend.¹⁰ The actual, front-foot values

⁸ Desiring to correct and amplify these data I will, of course, be glad to correspond with any reader, for I hope that this is not one of those products that is prepared entirely for the edification of the writer and I am very willing to pass on to individuals by correspondence the figures I am using for their own cities.

Several figures taken from other studies were permitted to stand after verification. The cities are as follows: New York, N. Y.; Rochester, N. Y.; St. Paul, Minn.; Providence, R. I.; Hartford, Conn.; Chattanooga, Tenn.; Albany, N. Y.; Knoxville, Tenn.; Decatur Ill.; St. Petersburg, Florida. They were taken from the material mentioned in note 5 above.

⁹ The value given for Atlantic City, N. J., is the best front-foot value on the boardwalk. Boardwalk corners have an even higher value. The best front foot on Atlantic Avenue, the principal business street of the City, is a little more than $\frac{1}{2}$ the figure given here.

¹⁰ A five-point average was obtained by taking the items for the first five cities, adding them and dividing by five, and the result is an average which is placed opposite the middle city. This is done successively through all the cities until a typical or average figure is obtained for each city. A line drawn through these points shows the trends in the series. (For more detailed discussion of the determination of secular trend, see E.

(Footnote 10 continued on page 274)

are shown for those who want to make comparisons between individual cities. The purchasing power curve is explained subsequently.¹¹

Curve Comparisons. A significant comparison is found in checking points on the purchasing power curve with the actual peak, front-foot values. The general correspondence of high and low points on both curves vindicates the influence of purchasing power on business values. Examples of striking correspondence are seen in Buffalo; White Plains; Springfield, Massachusetts; Rochester; Youngstown; and Pontiac. Striking failures to correspond also appear. Asheville, North Carolina, is an example of high purchasing power and low front-foot value. The resort aspects of this city probably bring in a transient purchasing power which affects the business values but which would not be felt in the purchasing-power tabulations. Ardsley, Santa Ana, and Santa Monica might be cited as other exceptions explainable largely through the influence of adjoining large cities. But aside from these striking instances, both positive and negative, the general correspondence between purchasing power and peak values should be noted. Another interesting point in this connection is that introduction of the population element, by comparing the purchasing-power and ratio curves, does not increase the correspondence between the purchasing-power and value movements.

(Footnote 10 continued from page 273)

E. Day, *Statistical Analysis* (New York: Macmillan Co., 1925).

The end items are included by repeating the last figure in order to give the five numbers necessary for the average; for example:

New York, N. Y.....	.0075
New York, N. Y.....	.0075
New York, N. Y.....	.0075
Chicago, Ill.....	.0135
Philadelphia, Pa.....	.0167

The most significant movement on the chart is revealed by comparison of the trend of the population-value ratio with the size-of-city curve. It will be noted that the ratio falls as the city grows larger. At this point it is pertinent to check what Richard M. Hurd, whose *Principles of City Land Values* should be the ground school for every real estate investor and practitioner, has to say on per-capita values. He estimates the highest price of land in American cities to be about \$35 a front foot for each 1,000 inhabitants, if the population does not exceed 500,000. In per-capita terms, as used in this study, the corresponding figure would be 3½ cents.

"... An approximate scale of normal values based on the consideration that each thousand of population adds from \$10 to \$12 to the front foot value of the best business locations and from \$1 to \$2 to the front foot value of the best residence locations would be as follows, it being understood that the application of any such scale is limited in practice by differences in wealth, character of industries and inhabitants, topography, transportation, platting, climate, etc."¹²

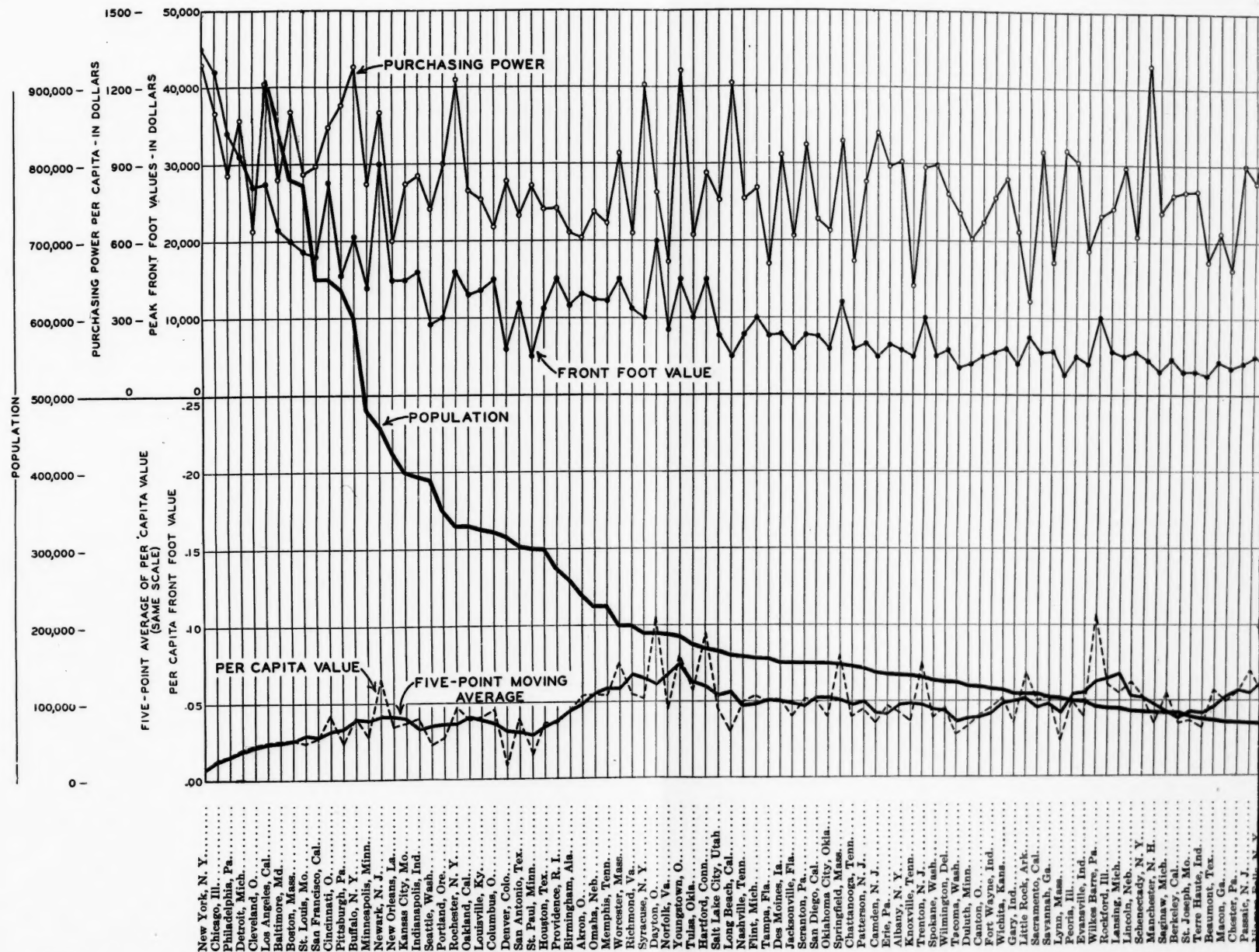
This generalization does not recognize that per-capita value recedes with increasing population.

Average Per-Capita Value. The following table shows the average per-capita value in several population groups for the cities shown on the chart. The decrease of the ratio can be clearly seen, and especially significant is the rather precipitous drop in the average per-capita values for cities larger than 300,000. One explanation is that this is the approximate point at which sub-center influences become important.

¹¹ *Infra*, p. 276.

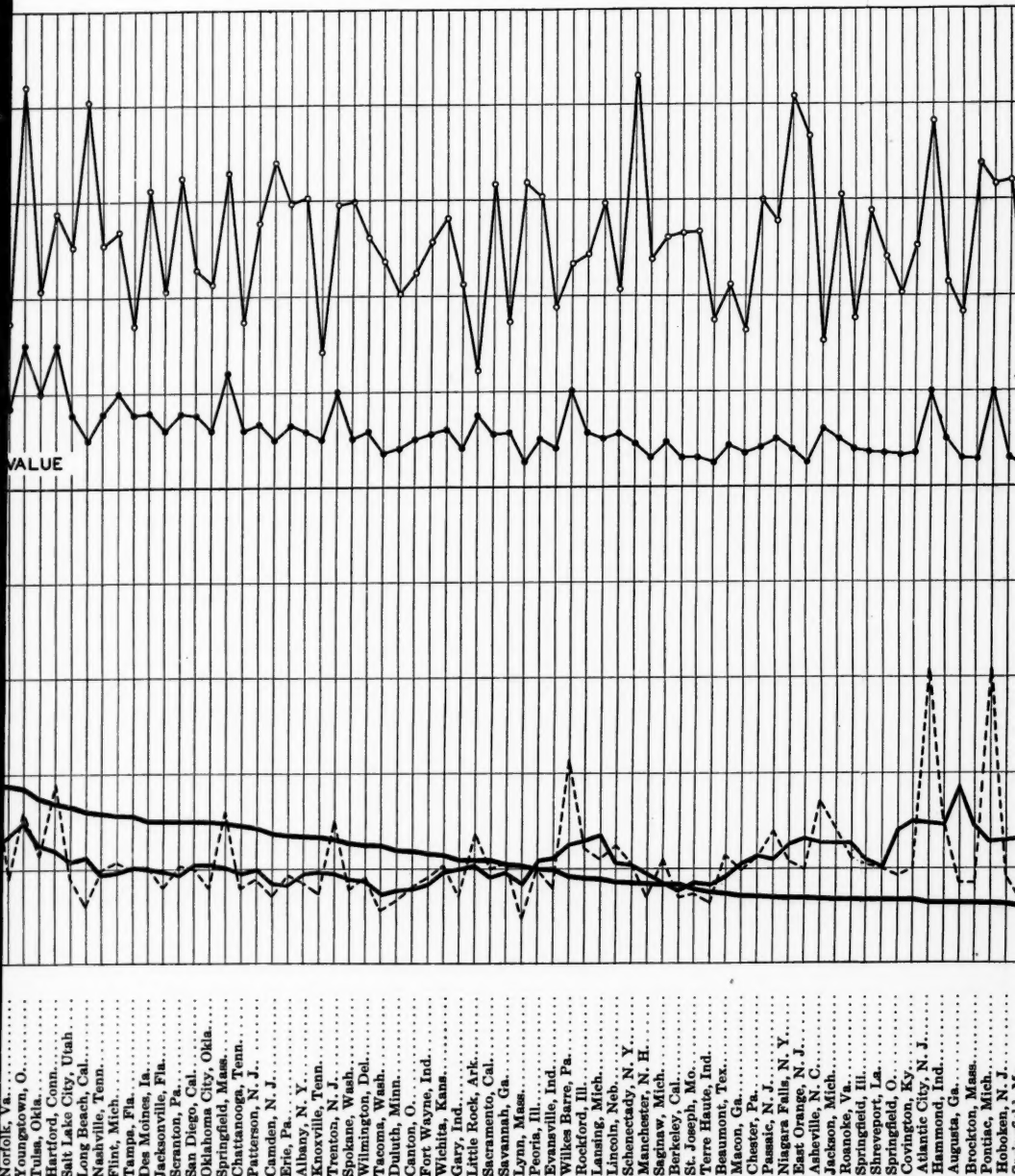
¹² Hurd, *op. cit.*, p. 142. In a later edition, in which the text is not changed substantially, a preface indicates that the values given should be multiplied by three to approximate the general changes in land values which have occurred in the 30 years since the collection of his data.

POPULATION AND PEAK



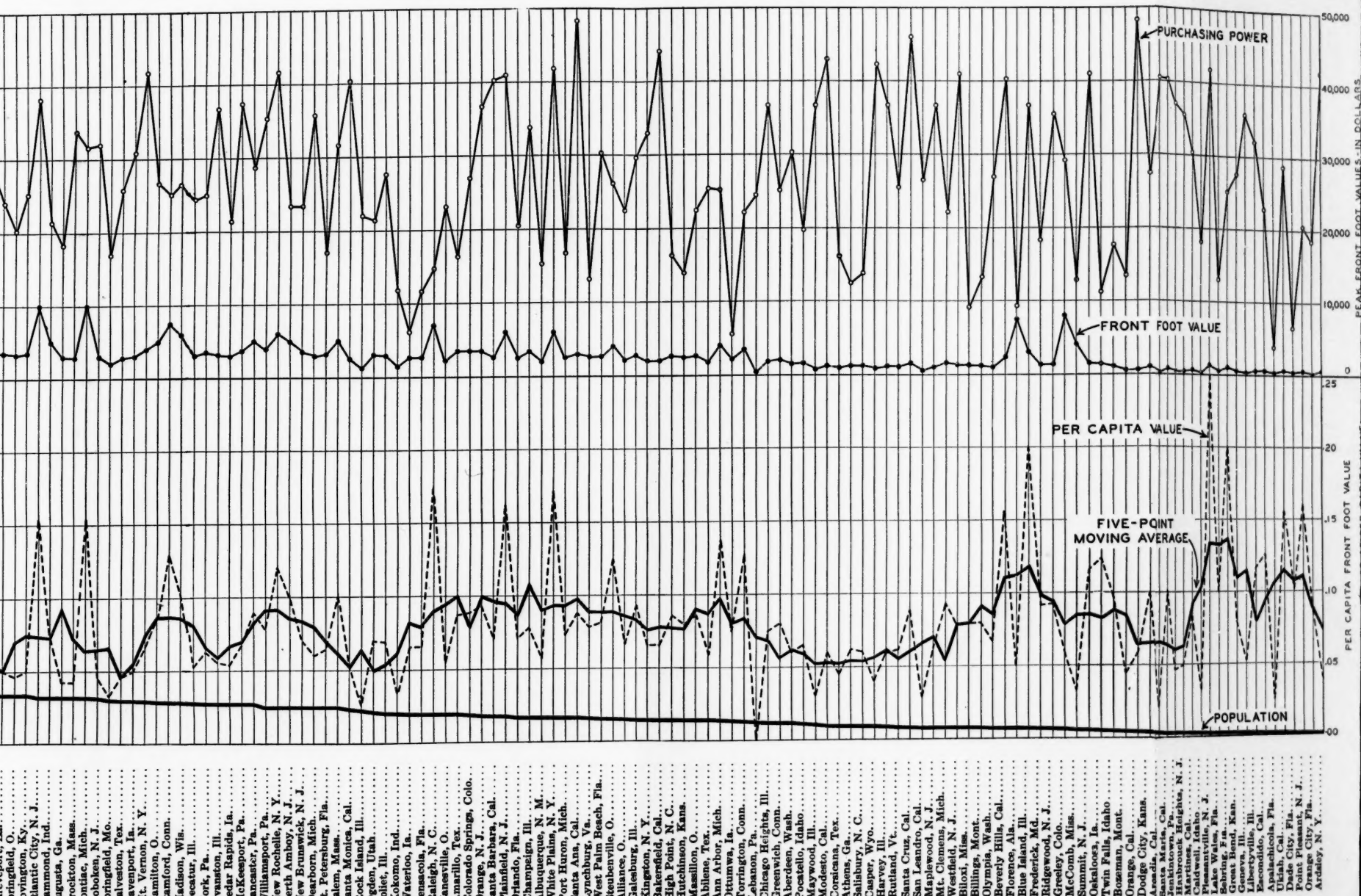
* Space limitations prevented completion of the population curve for cities over 1,000,000. These six cities with their approximate populations are as follows: New York, 5,970,000; Chicago, 3,102,000; Philadelphia, 2,035,000; Detroit, 1,650,000; Los Angeles, 1,500,000; and San Francisco, 1,496,000.

POPULATION AND PEAK LAND VAL

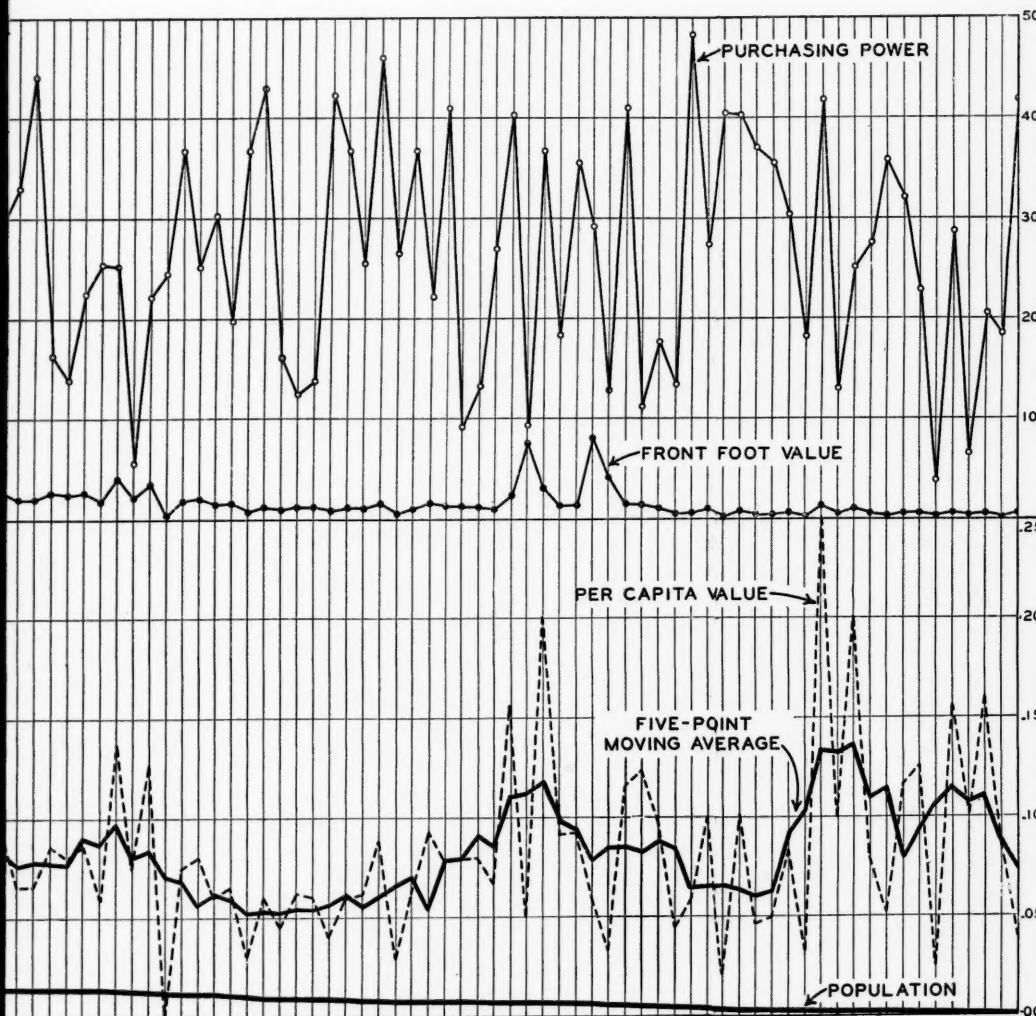


For approximate populations are as follows: New York, 5,970,000; Chicago, 3,102,000; Philadelphia, 2,035,000; Detroit, 1,535,000; Cleveland, 1,136,000.

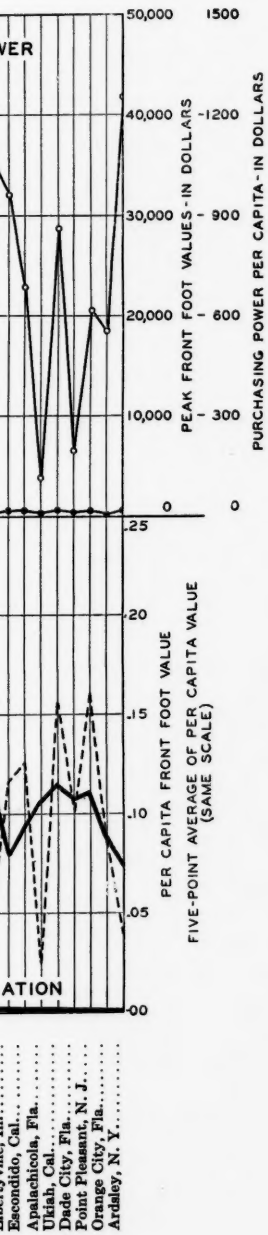
ND VALUES IN BUSINESS DISTRICTS*



* Cleveland, 1,136,000; Los Angeles, 1,100,000.



Kingston, N. Y.
 Bakersfield, Cal.
 High Point, N. C.
 Hutchinson, Kans.
 Madison, O.
 Abilene, Tex.
 Ann Arbor, Mich.
 Oshkosh, Wis.
 Ottumwa, Ia.
 Torrington, Conn.
 Lebanon, Pa.
 Chicago Heights, Ill.
 Greenwich, Conn.
 Aberdeen, Wash.
 Pocatello, Idaho
 Maywood, Ill.
 Modesto, Cal.
 Concordia, Mo.
 Athens, Ga.
 Salisbury, N. C.
 Casper, Wyo.
 Haverly, Ill.
 Rutland, Vt.
 Santa Cruz, Cal.
 San Leandro, Cal.
 Maplewood, N. J.
 Mt. Clemens, Mich.
 Westfield, N. J.
 Blount, Miss.
 Billings, Mont.
 Olympia, Wash.
 Beverly Hills, Cal.
 Florence, Ala.
 Blue Island, Ill.
 Frederick, Md.
 Ridgewood, N. J.
 Greeley, Colo.
 McComb, Miss.
 Summit, N. J.
 Okaloosa, Ia.
 Twin Falls, Idaho
 Bozeman, Mont.
 Orange, Cal.
 Dodge City, Kans.
 Arcadia, Cal.
 Santa Maria, Cal.
 Jenkintown, Pa.
 Hasbrouck Heights, N. J.
 Martinez, Cal.
 Caldwell, Idaho
 Pleasantville, N. J.
 Lake Wales, Fla.
 Sebring, Fla.
 Great Bend, Kan.
 Geneva, Ill.
 Libertyville, Ill.
 Escondido, Cal.
 Apalachicola, Fla.
 Ukiah, Cal.
 Dade City, Fla.
 Point Pleasant, N. J.
 Orange City, Fla.
 Ardsley, N. Y.



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TABLE I. AVERAGE PER CAPITA FRONT-FOOT VALUES, BY GROUPS OF CITIES.

Population Range	Number of Cities	Average per Capita Value
Under 10,000.....	22	.0929
10,000 to 19,999.....	20	.0857
20,000 to 29,999.....	14	.0658
30,000 to 39,999.....	21	.0880
40,000 to 49,999.....	10	.0704
50,000 to 59,999.....	16	.0811
60,000 to 69,999.....	11	.0696
70,000 to 79,999.....	13	.0563
80,000 to 89,999.....	6	.0464
90,000 to 99,999.....	3	.0748
100,000 to 199,999.....	38	.0506
200,000 to 299,999.....	7	.0539
300,000 to 399,999.....	11	.0346
400,000 to 499,999.....	4	.0418
500,000 to 599,999.....	..	.....
600,000 to 699,999.....	4	.0340
700,000 to 799,999.....	2	.0248
800,000 to 899,999.....	1	.0252
900,000 to 999,999.....	..	.....
1,000,000 to 2,999,999...	4	.0214
Over 3,000,000.....	2	.0105
Total.....	209	.....

Factors Influencing Peak Values

The central values in a city, as indicated by highest transactions, are attributable to a definite relationship between population and the buying power of that population balanced against the special characteristics of the city or its inhabitants.

The special characteristics of a city are partially evidenced by a scholastically created classification of cities into political, commercial, industrial, recreational, etc. These categories fit a few cities, for no one doubts that Atlantic City is primarily recreational and that Washington is largely political. However, examine a majority of the 200 odd cities included in these tabulations and decide, if you can, whether these categories are suggestive. Every commercial city has many recreational, as well as some political and educational, aspects. As a matter of fact, probably the larger portion of a city's population lives by doing things for one another, i. e., the traditional taking in of one another's

washings. The all-important stream of industry or general income from outside relationships is minor in relation to total income, with the exception of that derived from transactions with the immediate hinterland. Thus, any classification on the basis of activity, with the probable exceptions of recreational or educational, involves characterizing and classifying on the basis of the activity of a small portion of the urban group. In other words, the similarities of occupation and interest in all cities are very great. An interesting experiment would be to ascertain to what extent a modern and fair sized city is self-sufficient;¹³ i. e., the individual inhabitants are occupied in selling things and services to one another.

Peculiarities of Population. This factor may involve everything from racial distribution to the quantity and habits of the leisure class. An example might be the highly stabilized annual income that is found in a university community. Some areas may be occupied by the homes and estates of commuters, while others have an almost complete absence of a wealthy class.

Buying Power of Population. This factor is of extreme importance and attention was given to it on the accompanying chart which tells the whole story. The buying power is characterized by three ideas: (1) the amount; (2) the quality, which may very effectively change the land-value situation; and (3) the distribution. By distribution of buying power is meant its accessibility to trading points, particularly the central district. This is affected by transportation facilities in terms of "time plus cost of accessibility." The buying-

¹³ Studies bearing on this point are being conducted by the Bureau of Foreign and Domestic Commerce of the United States Department of Commerce and published in their series of *Market Data Handbooks*.

power index used on the accompanying chart is taken from the Sixth Annual Edition of *Sales Management*.¹⁴

The statistical objective was to measure the buying power of a community by ascertaining its spendable money income. The figures include only such items as affect current income. They attempt to take account of all "wages, salaries, fees and commissions of every sort, business profits and all the miscellaneous items of income." The technique and previous findings of the National Bureau of Economic Research were relied on and followed. The figures include only money incomes and not incomes for services for which there is no money consideration, nor are inventory gains and the like included. Of course, factors of wealth, such as crops, value of manufactured products, bank deposits and all other such measures, were excluded. The unit of calculation is the county and in presenting the buying-power index on the chart, the figure for the county in which the city was located was used.

Nearby Cities. Adjoining cities or suburban towns color the relationship between peak values and population. This element is present whenever one makes careful investigation of land values. Shopping resources for high-purchasing-power groups in adjoining larger cities may very definitely affect peak values, since peak values are frequently associated with women's shopping. As illustrating the effect of adjoining cities, undoubtedly the fact that Long Beach, California, is within 20 miles of Los Angeles is a determining factor in the central-district values of both cities.

Character of Surrounding Non-Urban Territory. The nature of the hinterland affects the activities, numbers and buying power of the city population. The location of some of our western cities,

such as Seattle and Portland, in the midst of timber areas is undoubtedly a deterrent to their reaching peak values commensurate with values attained in cities of equal size in the heart of an agricultural region or adjacent to major distribution points. The presence or absence of a prosperous agricultural belt may affect front-foot values in some cities; for example, Gary, Indiana. Of course, in the case of Gary, the population's buying power is not great.

Peculiarities of Industry and Trade. The variety of manufacturing, packing, oil refining, and the whole gamut of productive and distributive activities may affect the land-value picture. For example, some cities are one-activity towns; Gary and Akron immediately come to mind. Obviously, the above suggested factors are interrelated. For example, the character of industry may affect the labor personnel or population, qualify the buying-power factor, and be the source of business movements which affect land values.

Booms and Depressions. This factor involves that rather unknown economic phenomenon, the real estate market. Clearly, the expectations of buyers and holders regarding the future of the city and its commercial district may affect very definitely the rates at which economic rent is capitalized.

Closely related to these more or less spectacular and recurring elements in the land-value drama are the effects of expectations as to the direction of movement of land values. This element of movement, as for example the northward tendency of Seattle's business district, together with the speculative activity which it may foster, can very definitely affect peak values. A contrary effect may be caused by a pending im-

¹⁴ Published by Sales Management Inc., 420 Lexington Avenue, New York City.

provement cost or assessment to be levied, which would tend to keep down land values.

Size and Shape of Business District. Every student of city land values realizes that topographical considerations frequently cause business areas to be constricted. In some cities the general character of improvements may result in concentration of the business district. The convergence of transportation facilities is an instance in point, and the influence of Manhattan Island, the Chicago River, the hills in San Francisco and Seattle is similarly significant. A variety of situations prevail in the 100% districts. For example, in Long Beach, California, the majority of the transportation lines of the city converge within an area of two or three blocks. This creates a comparatively small 100% retail shopping district.

Conclusions

1. Population is only one of the forces determining peak business values.
2. Other things being equal, land values in business districts rise with the increase of population but not in direct proportion to that increase.
3. Per-capita front-foot value decreases with the increase in population.

4. The rate of decrease in per-capita value seems to change and accelerate when the population passes 300,000. This may be partly the result of decentralization or development of sub-centers, which are both typical of cities of that size and larger.

5. A number of cities have unusually high per-capita values and some have unusually low per-capita values. These may be caused by inaccurately reported information on values or defective population estimates. Also the peak value may be affected by any one or several of the factors enumerated in the preceding section.

6. Buying-power influences are evident when one inspects the actual per-capita, buying-power estimates in relation to actual, peak-value figures.

7. The following quotation is substantially correct:

"The highest values of land occur where there is the greatest concentration of population and wealth. In the final analysis it is purchasing power and demand of the population more than their numbers that make or raise values."¹⁵

Yet, the rough correspondence between numbers of population and high front-foot values should not be forgotten.

¹⁵ *Regional Survey of New York and Its Environs*, op. cit., vol. II, p. 151.

THE FARE PROBLEM OF THE ATLANTA STREET RAILWAYS*

By JAMES M. WRIGHT

IV. *The Second Fare Case*

IN June, 1920, when prices had just passed their peak, application was made for an eight-cent fare. The situation this time was called a "crisis," not a mere "emergency." Company officials came confident that they need only give facts in order to prove the necessity of higher rates. They said that for the whole Company the wage bill alone was to be \$1,520,000 larger than that of 1918,¹⁰⁰ that construction and paving costs had grown to unprecedented totals, that prices of other things had risen beyond any dreams of the day when the first fare adjustment had been made and that, with money costs so high, keeping up operations necessitated incurring bills that could not be paid. Deficits had begun to appear; the Company's credit was suffering severely;¹⁰¹ and the service was on the verge of breakdown.

To give more of this would seem to be repetition, because this situation differed from that of 1918 only in acuteness. On this application, however, the evidence was more skillfully presented and its educative and convincing effects were

acknowledged by two of the opponents.¹⁰²

But the cause was unpopular. Here was a giant corporation, swollen with the revenues of its extensive and lucrative enterprises, seeking more tribute from the common people. Therefore, an opposition, "fighting the devil in the shape of this company, and serving the Lord," held on to the end. Its objections were: (1) that no further advance of fares ought to be made, because, as one said, in fixing the fare at six cents the Commission had made the "distinct statement in the order that the original rates would be restored as soon as the emergency terminated";¹⁰³ (2) that the object of the application was to get a full return on an excessive capitalization.¹⁰⁴

To the Commission these were illusions. But, however ill-grounded, they served to deepen its sense of its own responsibility. It lamented the attitude of the people,¹⁰⁵ and expected its decision to be distasteful to them but justified itself by recurring to first principles of rate-making. These were, on the one hand, that the public was not to be overcharged and, on the other, the

¹⁰⁰ *Ibid.*, pp. 9, 154.

¹⁰¹ Hearing of 1920, p. 5. Cf. Opinion and Order, 1920, p. 8.

¹⁰² *Ibid.*, p. 4. Cf. Hearing of 1920, pp. 45, 46, 508, 520, statement of J. Hurt, and pp. 669, 671, and 675, refutation.

¹⁰³ Two statements smack strongly of the keenness of this feeling. "No public service commissioner finds any degree of enjoyment in any official act which results in placing additional burdens upon the public." (Opinion and Order, 1920, p. 3.) There was a no man's land between excessive charge on the one side and fair return to capital on the other "and whoever ventures there to adjust these delicate balances, whether Court or Commission, frequently returns bearing the scars of criticism; seldom the meed of praise." (*Ibid.*)

* The first installment of this article which appeared in the May issue of the *Journal* traced the history of the Atlanta street railway fare case, which was decided in March, 1919, and outlined the conditions which underlay the demand for increased fares. Footnotes and tables in this installment are numbered consecutively with those in the first article.

¹⁰⁰ Hearing of 1920, pp. 146, 147.

¹⁰¹ *Ibid.*, p. 42. A Company official said: "The Georgia Railway and Power Company can't borrow a single solitary dollar, not one, because its revenues are not sufficient to pay its charges and a sufficient margin over to justify people to put money into it." Cf. also pp. 200, 201.

utility was to be allowed a "reasonable return upon a fair value of its property used in the public service."

But conditions had so changed that "what would have been a proper rate of return for invested capital in . . . public utilities a few years ago furnishes no safe criterion for the present or future."¹⁰⁶ Therefore, "the whole matter is continually under the scrutiny of the Commission . . . and can be re-opened at any time . . . New conditions may arise tomorrow which will make unreasonable, one way or the other, a rate which today is just and fair."¹⁰⁷

The Commission had no quarrel with protestants who claimed that an excessive capitalization was an unsafe basis for reckoning a reasonable rate of return. However, it had not used capitalization as a basis in 1918 and was not doing so in this case.¹⁰⁸ Neither was it content to take account of "naked 'bare-bones' properties" alone. On the contrary, it attempted to have regard for every element that had a legitimate share in making up the costs of the railway service. Pursuing this line, it included the costs of organization, establishment, unification and adjustment of all parts to the whole as serving the community,¹⁰⁹ and allowances not merely for minimum operating expenses but also for interest on bonds, for sinking fund requirements, rentals and losses, for maintenance of plant in a state of efficiency, for such cash as was required for current purchases and for meeting payroll obligations, and finally for

"stockholders a dividend equal to at least the lowest current rates of interest, not on the par or market value of the stock, but on the actual value of the property necessarily used in providing the service."¹¹⁰ To allow only so much was to allow "bare existence rates." To allow less was "simple confiscation," a trampling of property rights under foot. It was social economy of that poor kind that denied to enterprise the capital for extensions and expansion required to meet the demands of a growing population. To allow more than "a reasonable return upon fair value of the property used," however, was unwarrantable exaction.¹¹¹

To make the investment attractive in the money market of that day an 8% return was necessary. Examined in the light of approved principles the returns derived from the railway were falling below 8%. The result was deficit, and the position of the railways was such that a portion of their deficit seemed to be "saddled upon the patrons of another department," electric light and gas.¹¹² Railways in other cities, more than 7,500 miles of them, had fallen into receivers' hands. The local Company was able to survive and function without change of rates but not able to meet the public demands for expansion and extensions required by the public interest.¹¹³ For these reasons the Commission raised the fares on all lines to seven cents, giving patrons the privilege of buying 15 tickets for a dollar.¹¹⁴

¹⁰⁶ *Ibid.*, p. 3.

¹⁰⁷ *Ibid.*, p. 9.

¹⁰⁸ *Ibid.*, p. 4.

¹⁰⁹ Engineers' estimates of reproduction cost new were rejected as a rate basis. But the Commission said: "Consideration of reproduction cost . . . should be had, just as should original cost of acquisition and construction." (*Ibid.*, p. 5.)

¹¹⁰ *Ibid.*, pp. 5, 11, 12, also 3, 7. Depreciation was calculated at the rate of 2.5% per annum.

¹¹¹ *Ibid.*, pp. 11, 13. Cf. *San Diego Water Company v. San Diego*, 118 Cal. 588 (1897).

¹¹² Opinion and Order, 1920, pp. 12, 13.

¹¹³ *Ibid.*, p. 14.

¹¹⁴ *Ibid.*, p. 15. A small amount of zoning of outer portions on two lines was ordered. A 20% addition to seating space, and on the College Park and Main Decatur lines trailers in rush hours were ordered (pp. 26, 27).

The Contract Fares. This order, dated September 22, 1920, increased from 20% to 40% the excess of these fares over the contract fares.¹¹⁵ It obviously accentuated the Company's desire to terminate the inequality of the two. An impressive maneuver followed. A letter from the Company's offices gave notice to the Municipal Council of Decatur that beginning on October 20 and continuing thereafter the fare on the Main-Decatur line would be seven cents. The Council at once sued for an injunction to prevent the change. Its petition was cross-billed and the court asked to restrain any and all interference with "fixing the rate of seven cents or any other just and non-discriminatory rate."¹¹⁶

The decree of the court, at first temporary and later permanent, granted the prayer of the Town.¹¹⁷ Appeal was taken to the Supreme Court which again passed upon the matter twice within a period of eight months.¹¹⁸ Two contentions stood out. In one of them the Company attempted to assert that as the Commission, though fully authorized, had failed to fix the fares, the Company itself could fix them. In the other the validity of the fare contracts was attacked. Both contentions were denied by the Court in opinions which were said to be mere re-affirmations of arguments

and conclusions arrived at in the mandamus case in 1919.¹¹⁹

The second point was argued with such vigor and persistence, however, that the Court made another "careful inspection" of the record of the case and in very plain language said: "The ruling in 152 Georgia 143 is not only *res adjudicata* of every issue involved in the present hearing, but is also the law of the case in the case now under review." This was unquestionably in accord with governing principles long and well established in judicial practice. The case had "had its day in court"¹²⁰ and nothing remained in it further to engage judicial attention.

Action in the state courts thus availed nothing. In 1923 an appeal to the Federal Supreme Court was tried. In this tribunal three chief issues were raised: (1) that the execution of the fare contract was beyond the legal powers of the Town; (2) that the low five-cent fare was confiscatory; and (3) that action by the state authorities improperly made the five-cent fare effective in territory annexed to Decatur after the fare contract was made.¹²¹ The Court was asked to find the contract void and release the Company from obligation under it. The report of the case is burdened with matter which had but little bearing upon

¹¹⁵ The Decatur line, some 2.98% of the whole mileage in 1920, earned 3.868% of the gross revenues of the City system.

¹¹⁶ Decatur Council Minutes, vol. III, pp. 325, 326. Cf. *Georgia Railway and Power Co. v. Town of Decatur*, 152 Ga. 145 (1921).

¹¹⁷ *Ibid.*, pp. 145, 146.

¹¹⁸ *Ibid.*, and 153 Ga. 329 (September, 1921, and April, 1922).

¹¹⁹ *Georgia Railway and Power Company v. Town of Decatur*, *supra* n. 116 at 147, 148. Language from an opinion of the Federal Supreme Court, *Southern Iowa Electric Company v. City of Chariton*, 255 U. S. 541, 542 (1920) was cited. It said that two propositions were indisputable: (a) that the power of governmental agencies to fix rates to be paid to public utility corporations does not include the power to fix them "so low as to be confiscatory of the property of such corporations,"

and (b) "Where . . . the public service corporations and the governmental agencies dealing with them have power to contract as to rates and exert that power by fixing by contract rates . . . the enforcement of such rates is controlled by the obligation resulting from the contract, and therefore the question of whether such rates are confiscatory is immaterial."

¹²⁰ 152 Ga. 334, 335. Another trial was had in the spring of 1929. The Company sought this time to establish a right to surrender its franchise and tear up and remove its tracks from the streets of Decatur. Said the Court: "This, under the terms of its contract, it cannot do." The contract was again upheld as valid (*Georgia Rwy. & Power Co. v. City of Decatur*, 168 Ga. 705 (1929)), and the right to abandon the line denied.

¹²¹ *Georgia Railway and Power Company v. Town of Decatur*, 262 U. S. 434, 435 (1923).

the merits of the dispute. But on the first and major issue it was found that in each of three separate, well-reasoned opinions the state court had upheld the contract as "valid and subsisting" in the meaning of the statute of 1907. To quote, "This conclusion involving . . . a construction of the state constitution and laws and of powers of state municipalities is controlling upon this Court, as it has decided many times." After this, no ground remained for being "concerned with the question whether the stipulated rates" were confiscatory. In all these matters the state courts were fully sustained.¹²²

The problem of the annexed territory had hardly been mentioned in the state courts. But here the contention was made that all such territory lay outside the zone to which the contract-fare proviso had originally applied and it was hinted that the proviso be "limited to passengers entering cars at the termini of the line in Atlanta and Decatur and not (allowed) to those entering at intermediate points."¹²³ The Court said, "The contract rates apply only to the town of Decatur, as it existed when the contract was made. To apply them to additional territory is to impose a burden upon the defendants (appellants) outside the contract . . ." To sustain them would have been to have impaired substantially the contract by adding to its burdens. Therefore the contract rates in this territory were not sustained¹²⁴ and the judg-

ment of the state court, in so far as it affected them, was reversed. Accompanying this decree was another of like date and import relating to the fares on the College Park line.¹²⁵

Present Position of Contract Fares. The subsequent history of the fare contracts is brief. In the summer of 1925 the General Assembly was petitioned to repeal the "valid subsisting contract" clause of the utilities act of 1907. Defeat of this, partly at least because of the urgent opposition of Decatur and College Park,¹²⁶ was followed by separate negotiations with the municipal authorities of the two communities and a different outcome for each.

In Decatur an expensive paving project on sections of two streets traversed by the loop line resulted in regularly charging to the railway the legal apportionment of the whole assessment.¹²⁷ In the same year (1925) and same season the Company endeavored to surrender and gain release from the fare contract, alleging that operating under it led to "certain and continuing loss."¹²⁸ Balked in this effort by injunction,¹²⁹ it attempted to negotiate with the City authorities to the same end in 1927 but was answered this time by a popular referendum which decisively rejected its proposals.¹³⁰ This was followed by an appeal to the Supreme Court to dissolve the injunction denying the right to surrender the franchise. The Court, however, sustained the injunctions and its

¹²² *Ibid.*, pp. 437, 438.

¹²³ *Ibid.*, p. 435.

¹²⁴ *Ibid.*, pp. 439, 440. It has resulted that any passenger entering or departing from a car within the earlier limits of Decatur pays a five-cent fare. An Atlanta-bound, in-bound passenger entering the same car in the annexed (intermediate) territory, or an out-bound passenger departing from a car in either Atlanta or the annexed territory pays the Atlanta rate.

¹²⁵ *Ibid.*, pp. 441, 442. The College Park contract was found to contain no provision requiring issuance of transfers.

¹²⁶ *Minutes* of College Park Council, August 3, 1925, and Resolution of same date, Decatur Commission, *Minutes*, vol. 4, p. 143.

¹²⁷ Decatur Commission, *Minutes*, vol. 4, pp. 142, 146.

¹²⁸ *Ibid.*, pp. 156, 159.

¹²⁹ *Ibid.*, pp. 171, 176, and Ms. No. 6,849, Supreme Court of Georgia.

¹³⁰ Decatur Commission, *Minutes*, vol. 4, pp. 328, 329, 339, 340.

decision has recently been upheld by the Federal Supreme Court.¹³¹

In College Park likewise an injunction prevented surrender of the franchise, and negotiations seemed inconclusive.¹³² But the injunction was succeeded by another writ which was not "an interlocutory injunction" and "not an exercise, or any attempt to exercise, any rate-making function." By means of it, however, permission was given to the railway, "pending said interlocutory hearing and until the further order of this court," to charge on traffic carried in either direction between any point on the electric line within the limits of College Park and any other point on the same line in either College Park or the City of Atlanta "the same minimum rate of fare as now prevails or may hereafter prevail for passengers" on the other lines of the Company in the City of Atlanta.¹³³ The interlocutory hearing has not been held.

Results of Second Advance of Fares. The fare adjustment of 1920 endured for seven years. Under it the railways assumed a definite status in which public service became their *raison d'être* and programs of economy and improvement the function of their management. As a result, pronounced endeavors have been made to put them on a self-sustaining basis and funds have been expended on plant and facilities with a view to supplying the population with adequate means of transit.¹³⁴ During the period between the fare adjustment in 1920 and the third fare case in 1927 several investigations were made by various parties which

disclose the results of the 1920 fare case, these being reviewed in the 1927 proceedings before the Commission.

Chief among the measures of economy in this period have been the following: abandonment, and removal in part, of seven or eight miles of track whose utilization was wasteful because it entailed duplication of facilities, or for other reasons;¹³⁵ reduction of the charge made by the electric department for power to a figure lower than that allowed to any other consumer;¹³⁶ use of one-man cars which were "introduced without opposition";¹³⁷ a time-saving re-arrangement of car stops and installation of economy meters on cars to save power;¹³⁸ and further changes in the reduction of numbers and enlistment, training, placement, organization and direction of officials and employees.

The improvement measures were not entirely unlike the foregoing. One of them was the retirement of property, either worn or obsolescent, which in the accounts led to a charge-off of \$1,465,734.¹³⁹ But chief of all were renewals, replacements, betterments and additions. Five miles of track and 200,000 square yards of between-track paving were renewed; 150 miles of new trolley, 85 miles of new direct-current feeder and three new substations were installed; steam generating stations were remodeled; a new car barn and a garage for busses were built; another garage was expanded; and 160 new street cars were bought.¹⁴⁰ The new investment expenditure on these properties totalled \$7,080,679,

return, however, they claim successfully the transfer privilege.

¹³¹ Ms. No. 6,849, Supreme Court of Georgia; Atlanta Constitution, May 20, 1930.

¹³² College Park Council, *Minutes*, September 24, 25, 1925; also August 19, 1925.

¹³³ Fulton Superior Court, File No. 65,791, Petition and Order, October 25, 1925. The transfer privilege is denied to the passenger entering a car in College Park bound for Atlanta, such that an estimated 25% of patrons so embarking and going to destinations on other lines are compelled to pay second fares. On their

¹³⁴ Hearing of 1927, pp. 11, 522.

¹³⁵ *Ibid.*, pp. 15, 60, 457.

¹³⁶ *Ibid.*, p. 17.

¹³⁷ Coffin Award Presentation, p. 120, and also p. 172.

¹³⁸ Hearing of 1927, pp. 15, 17, 18.

¹³⁹ Hearing of 1927, p. 68.

¹⁴⁰ *Ibid.*, pp. 65, 18.

which was made possible, not by excessive earnings, but by introduction of outside capital.¹⁴¹ The use of \$610,295 annually during five years for maintenance was also economy, if not improvement.¹⁴²

Consequently, according to the engineers, the condition of the properties, which had stood at 90% in 1920 had been raised to 94.33% by July, 1927,¹⁴³ and the state of maintenance and quality of service compared favorably with those of the best-equipped and best-conducted railways in the United States.¹⁴⁴

Conditioning and reconditioning properties in these ways no doubt inured to the benefit of the patrons. However, it was costly and its justification as a matter of social economy depended in part upon the amount of patronage and in part upon whether the revenues collected from the service afforded a reasonable interest return upon invested capital. This latter in its turn depended upon the valuation of the properties, which was a matter very much in dispute. Several attempts at valuation were made. A part of their results is given in Table VIII which shows that, although the estimates differ, the widest differences are not found by comparing the results arrived at by persons called in from the outside as experts.¹⁴⁵

¹⁴¹ *Ibid.*, p. 18.

¹⁴² *Ibid.*, p. 66.

¹⁴³ Hearing of 1920, p. 459, and Hearing of 1927, p. 68.

¹⁴⁴ *Ibid.*, pp. 19, 57. Cf. Opinion and Order, 1927, p. 11. A Company official stated that the railway had exhausted itself trying to meet the wishes of the City of Atlanta for high-class service.

¹⁴⁵ In reading the evidence on these matters imputations of motives for particular valuations offered are not difficult to detect. Without attempting to appraise these, a word may be said about each of those whose names appear in the table. The Baehr organization of Chicago was first called in when in 1912 the lease on the properties of the Georgia Railway and Electric Company was being framed. The outcome of accepting its

TABLE VIII. VALUATION OF RAILWAY PROPERTIES OFFERED IN HEARINGS BEFORE THE PUBLIC SERVICE COMMISSION

Basis of Estimate	Authority	Date	Valuation Estimate
Historical cost, actual.....	Baehr	1912	\$ 8,766,674
Historical cost, after auditors	Bachman*	1924	12,253,064
Historical cost, excluding jointly used property.....	Luick	1927	16,144,837
Historical cost, corrected to current prices.....	Baehr	1926	21,989,421
Reproduction cost, less depreciation.....	Baehr	1920	19,436,799
Reproduction cost, less depreciation.....	Baehr	1921	17,813,099
Reproduction cost, less depreciation.....	Bachman	1924	14,380,074
Reproduction cost, less depreciation.....	Baehr	1926	22,618,964
Reproduction cost, less depreciation, including jointly used property.....	Luick	1927	22,885,039
Fair value, basis for rates.....	Bachman	1924	14,700,000
Fair value, excluding jointly used property.....	Beeler†	1924	16,509,916
Reproduction cost, excluding land.....	Beeler	1924	18,905,102
Reproduction cost, excluding land.....	Luick	1927	18,205,855
Reproduction cost, including jointly used property.....	Luick	1927	24,261,780
Market value of securities.....	Bachman	1924	16,164,023
Value based on gross earnings‡	Comm.	1918	16,065,000
Value for rate-making.....	Comm.	1927	20,000,000

*Cf. Hearing of 1927, pp. 1073, 1074, 1075, 1077, 1078, attempted indictment of qualifications of Bachman, a flour miller, for evaluating street railway properties.

†From "Inventory and Appraisal" (p. 87) are the following figures for net capital additions at selected years: 1912, \$387,305; 1918, date of the first fare case, \$139,563; 1920, date of the second fare case, \$757,780; 1923, \$713,185. Historical appraisal of physical property of the railway department as of December 31 for the corresponding years showed \$9,153,979, \$10,307,923, \$11,307,117, and \$12,654,005.

‡Not offered before the Commission.

Certain other points with reference to these estimates are interesting. Valuations used as rate bases by the Commission lay well between the extremes of those offered by the other parties. In 1920, at least, the Commission rejected reproduction cost as a basis because of the high prices then prevailing.¹⁴⁶ In

findings at that time was the obvious reason for calling Mr. Luick who, as employee, had already performed much of the work previously done by the Baehr organization for the utilities Company. Mr. Beeler, although paid by the Company, was hunted up and employed by the City of Atlanta for the one extensive examination and report made in 1924. (See "Plan for Local Transportation," 1924, and *Atlanta Journal*, January 10, 1925, p. 4.) Mr. Bachman, a business man, undertook his investigations as chairman of the transportation committee of the Municipal Council of Atlanta. For political reasons his chairmanship was discontinued before he submitted his report to the Public Service Commission. (*Atlanta Journal*, January 1, 1925, p. 2; January 7, p. 8; Hearing of 1927, pp. 668, 699-725.)

¹⁴⁶ Opinion and Order, 1920, p. 8; also pp. 6, 7.

TABLE IX. SELECTED EXPENSES OF RAILWAY ACCORDING TO AUDITORS' CLASSIFICATION

Year	Maintenance	Conducting Transportation	Power	Traffic*	Renewal and Replacement Reserve	Taxes	Miscellaneous and General	Additions and Betterments	
								Cost as of Date of Outlay	Cost as of January 1, 1927
1928†	\$460,916	\$1,649,816	\$549,113	\$ 412	\$271,183	\$370,926	\$899,942	.....	.....
1927†	516,079	1,750,061	632,026	1,301	334,315	403,181‡	852,421	.....	.....
1926	569,232	1,772,888	595,088	19,269	443,153	541,579	763,690	\$1,592,679	\$1,608,022
1925	667,929	1,837,931	618,590	11,702	409,016	537,575	730,881	1,491,354	1,507,467
1924	591,423	1,845,149	598,705	6,767	377,005	447,985	725,511	883,938	881,273
1923	619,577	1,806,066	636,000	32,992	336,440	435,979	739,939	1,272,326	1,284,583
1922	603,318	1,803,044	575,396	1,661	314,755	420,794	696,769	588,109	670,073
1921	557,893	1,827,467	526,227	658	279,304	402,041	624,445	305,482	303,850
1920	.....	.....	.....	.....	.....	.....	.....	775,969	655,955

*Under this head are listed expenditures of a Public Relations Department.

†Data for 1927 and 1928 not from same report as the others.

‡The falling off in tax costs after 1926 is explained by a re-allocation of tax burdens as between the properties of the different utilities of the Company, which reduced the railway's share of the taxes.

1918 it did "not approve of the method of attempting to segregate and attach specific items of value, as 'Going Value.'"¹⁴⁷ In 1927 in its valuation figure of \$20,000,000 it allowed \$4,000,000 for street paving paid for by the railroad.¹⁴⁸ An additional fact was that estimates of reproduction cost excluding land arrived at by both Beeler and Luick fell between \$18,000,000 and \$19,000,000.¹⁴⁹

These variations in property valuations entailed variations in calculation of net returns. Account books and records were less subject to public scrutiny than were the physical properties. Parts of their contents, however, were made available in the regular reports sent to the Public Service Commission and in the two audits covering the years 1921-1926.¹⁵⁰ Table IX repeats lines of the auditors' figures and shows that costs of maintenance and conducting transportation did not reach a permanently higher basis, while those of power and miscel-

lanies did. The total result, as seen in Table VI (in previous article), shows a 3.8% diminution of gross earnings as a result of jitney competition in 1924 and a recovery after the jitneys were abolished in 1925. After 1922 and until 1928 no marked change took place in gross income, operating expenses, or the operating ratio. According to the *Beeler Report*, this stalemate allowed 10 of the 23 lines of railway to fail to earn enough in 1923 to cover all charges against them¹⁵¹ and on all lines in four years an actual decline of 39.2% in net operating returns. Table X gives a partial statement of net returns and deficits.

The figures of Table XI are taken from *Beeler's Report* on individual car lines for the year 1923.¹⁵² They show the largest and the smallest of both surpluses and deficits which were arrived at in each case by deducting from operating revenues all current charges. They also

cost new, less non-essential construction, as \$18,905,102, going concern value excluded.

¹⁴⁹Opinion and Order, 1927, p. 8. Cf. Hearing of 1927, Exhibit Nos. 3, 6.

¹⁵¹Beeler, "Plan for Local Transportation," pp. 65, 92. Among these charges were taxes and renewal and replacement costs. Cf. Coffin Award Presentation, pp. 119, 121.

¹⁵²Beeler, *op. cit.*, p. 92, Exhibit 18.

¹⁴⁷ 46 G. R. C. R. 439. Cf. Opinion and Order, 1927, p. 5, apparent recognition by the Commission of going concern value as an element in reasonable valuation. There was some question about Beeler's allowance on this point (Hearing of 1927, pp. 101, 132, 133, 160).

¹⁴⁸Opinion and Order, 1927, pp. 11, 12. Cf. Beeler, "Inventory and Appraisal," p. 23.

¹⁴⁹Hearing of 1927, pp. 93, 94. Beeler, "Inventory and Appraisal," Summary, p. iii, gives reproduction

show the total amount of the deficits on the 10 deficit lines and the total surpluses on the other 13 lines. Again they show that the Main-Decatur line, whose longest riders paid the five-cent contract rate, was in the surplus column, although its operating revenues were but 64.5% of those of the College Park-Hapeville contract line which is in the deficit column.¹⁵³

TABLE X. PARTIAL STATEMENT OF NET RETURNS AND DEFICITS.*

	Net Returns (Beeler)	Percentage Returns		Alleged Deficit under 8% Return
		Auditor	Public Service Commission	
1926	.....	2.2	3.8	\$1,477,642
1925	.....	1.3	.....	1,600,803
1924	\$566,358	2.0	.....	1,368,306
1923	738,957	2.9	.....	1,126,111
1922	841,742	3.3	.....	971,783
1921	989,528	4.6	.....	675,908
1920	930,218	.....	.....	.....

*The Beeler Report, p. 67, states that the return for 1924 was equivalent to an 8% return on only \$7,090,000 capital. The right hand column is taken from Exhibit 4 offered in the Hearing of 1927. Calculation is based on Baehr's inventory, 1921.

A brief statement about certain items of expenditure and about financial relations between departments of the Company is in place. The investigations disclosed that from earnings the railways had set aside 2.5% of estimated capital value for depreciation and 1% of gross revenues for contingent reserve, and that the following other sums had been allowed:

For interest on investment in street pavements.....	\$280,000
For depreciation of street pavements.....	100,000
For gross receipts tax, City of Atlanta.....	180,000 ¹⁵⁴

Here are five items. Provision for the first, third and fourth of them had been urged by expert investigators and their recommendation endorsed by the Public Service Commission.

Certain other items and estimation of the whole financial condition led to a consideration of the relations of the rail-

TABLE XI. OPERATING REVENUES, DEDUCTIONS AND NET OPERATING RETURNS OF SELECTED LINES OF THE SYSTEM.

Lines Yielding Surpluses	Operating Revenue	Total Operating Deductions	Net from Operations
Peachtree-Whitehall.....	\$580,009	\$401,386	\$178,623
Ponce de Leon-West View	481,418	308,177	173,241
Inman Park-Georgia Ave.	457,819	346,658	111,160
Main-Decatur.....	244,380	209,030	35,350
Orme-Magnolia.....	87,053	86,868	185
Lines Yielding Deficits			
Courtland-Woodward.....	\$ 116,945	\$ 149,495	\$ -32,550
Luckie-Washington.....	249,634	276,686	-27,052
Piedmont-Central.....	174,632	195,607	-20,976
College Park-Hapeville.....	378,631	384,583	-5,952
S. Decatur-East Lake.....	149,459	151,866	-2,407
Total Deficits on 10 Lines.....	.....	.....	\$-141,959
Totals for All Lines.....	\$5,244,205	\$4,505,248	\$ 738,957
Total Surplus on 13 Lines.....	.....	.....	\$ 880,916

ways to other departments of the Company. One such item was the charge made by the electric department for power used by the railways. Critics of the Company seemed to hold that, because of the close alliance between the electric department and the railway, the rate on power could be kept low and thus railway expenses and consequently car fares kept low also. Faced with exhibits alleging that railway expenses were high and receipts too small to cover them

¹⁵³ It will be recalled that on both of these lines intermediate traffic paid the regular city fare. (*Supra*, p. 282.) But the percentage of contract-fare traffic was greater on the surplus than on the deficit line. This excess was based on the greater population of Decatur and the greater accessibility of street car service because of the loop which lies wholly within the restricted area to which the contract fares applied. The population of the contract-fare communities was as follows:

	1920	1910	1900	1890	1880
College Park.....	3,622	2,173	517	.....	.....
Decatur.....	6,150	2,466	1,418	1,013	639

¹⁵⁴ Opinion and Order, 1927, pp. 8, 12. The record of the City Auditor of Atlanta shows that the Company reported the sum of \$2,496,000 as gross receipts subject to the 3% tax for the year 1926. On that sum the total tax should have been \$74,880, not \$180,000. According to the Public Service Commission, the effect of saddling this tax and the shares of paving assessments on the railway was that "this Company operates under conditions which prevail in comparatively few cities throughout the country." (*Ibid.*, p. 11). Cf. Hearing of 1927, p. 720, and also pp. 88, 96.

adequately, they argued that the charge for power must be too high.¹⁵⁵ They were appraised, however, that the rate was one cent per kw. hr., "minimum rate authorized by the Commission to be charged to wholesale industrial customers." The total bill for power on that basis was a large item, but to have charged a lower rate would have discriminated against other users of electricity and increased the railway's dependence upon the power of the electric department. Hence the Commission looked upon the established rate as not unreasonably high.

In 1927 an auditor, acting for the Public Service Commission, reported that in his opinion overcharges aggregating \$457,957 had been put into the tax account of the railways for the three-year period 1924-1926.¹⁵⁶ A checking over and redistribution of shares of this burden "between the various departments of the Company" for the year 1926 resulted in "increasing the Company's (railways') net revenues as of 1926, in an amount of approximately \$150,000" by taking away the excess charged to them. The Commission took cognizance of this item.¹⁵⁷

Apart from this, but little specific objection to the accounts was raised.¹⁵⁸

In handling funds inside the Company after expenses were paid, any surplus or deficit in any department went into a common chest. By that means any surplus in the latter could be used to cover a departmental deficit without making public the details, although the Public Service Commission is authorized to become apprized of them. It is difficult, even alleged to be impossible, to ascertain the fixed charges of the railways alone, although 72.24% of the bonds outstanding against the properties inside the "seven-mile zone" in 1918 was said to be chargeable to this department.¹⁵⁹ As to operating receipts and expenses, however, much information is to be had. And it was on the basis of this that the Company, seconded in principle by the Public Service Commission, asserted that under the seven-cent fare such deficits had accrued that the returns realized on the capital sunk in the railways were insufficient to attract funds adequate to supply the transportation needs of the community and that this department on account of financial weakness was leaning upon the other departments. The Commission said: "but for the sustaining credit of the light and power and gas properties . . . the street railway business would have long since

¹⁵⁵ Opinion and Order, 1927, pp. 8, 9, and Hearing of 1927, p. 459.

¹⁵⁶ Hearing of 1927, Report of Audit Company of the South, p. 2. The auditor compared his own findings as to railway net earnings with those on the Company's books thus: Earnings as shown by

	1926	1925	1924	Total
Company's books, \$995,569	\$730,310	\$828,420	.....
Auditor's report, 1,145,472	956,664	910,121	.....
Excess in latter, 149,903	226,353	81,701	\$457,957	

Cf. Hearing of 1927, pp. 718, 1,055. A Company official in testimony (*Ibid.*, pp. 1,056, 1,057) explained that his difference in findings was attributable mainly to the refusal of the federal income tax service to treat the Company as a consolidated concern and that it had treated the rental paid to the Georgia Railway and Electric Company as taxable income. Other auditors had said that the tax would not have been so large had

not the lessor-lessee relationship existed. It is notable that, as shown in Table IX herein, the taxes for 1927 and 1928, after the lease had been extinguished, were less than those of 1926 by \$138,000 and \$170,000 respectively. Cf. *Ibid.*, p. 718, statement of Bachman, witness (*Supra*, n. 145), that the auditors had satisfactorily explained the tax tangle. Cf. also Opinion and Order, 1927, p. 8.

¹⁵⁷ *Ibid.*

¹⁵⁸ Hearing of 1927, p. 1,055.

¹⁵⁹ *Proceedings* of 1918, p. 192. A Company official writes that, excepting bonds issued before 1902, "all bonds have been issued upon the joint security of both the electric properties and the street railroad properties, and consequently it is impossible to make any allocation of bonds to the street railroad, except a purely arbitrary one."

been paralyzed."¹⁶⁰ And buttressed by the other departments the railway was supported in part by the patrons of those other departments, many of whom, it was alleged,¹⁶¹ rarely, if ever, rode on a street car. This was true of patrons of the electric department residing both inside the metropolitan district and outside in other communities of the State.

This condition may be attributed either to the small earnings of the large amount of low-density traffic of the railways, both on the seven-and-a-half-cent and five-cent fares, or to the fact that the general level of fares was as low as it was, or to an excessive valuation of the properties on which interest returns were desired by the owners. Although the popular and political preference in Atlanta was for the third of these, the economist prefers the first, because he finds that dense traffic lines take in large receipts without much greater expense per car mile than light traffic lines. The seven-cent fare period was one of fluctuating, not of growing, traffic, and as a result the average receipts for 1925, 1926 and 1927 were less than those for 1923.

Thus the seven-cent fare failed to bring satisfaction. A change of results was desired by the management, but to bring about a change was not a simple matter. Nevertheless, it was undertaken. But efforts to coerce, which had marked the contract-fare episodes, gave place in Atlanta to a cooperative program. A

public relations service was instituted, conciliation became the watchword, and a "Constructive Plan for Solving the Present and Future Transportation Problem" was outlined.¹⁶² In 1923 the City Council was asked to endorse an application for a new advance of fares as a means of placing the railways on a self-sustaining basis; copies of the petition were widely circulated and discussion through the press and forum was carried to and invited from citizens, especially those in civic, social, political, labor and business groups.¹⁶³ Council replied that it had no jurisdiction over fares and without recommendation referred to the Railroad Commission as the authority to be consulted. A Council committee, however, held open hearings on the question and the Council itself at the expense of the railways employed the Beeler organization to investigate the situation and formulate recommendations to be submitted to the City and Company. Its report pointed to the dependence of the City "upon the proper functioning of the local transportation system" and warned that the deficiency of revenues of the railways was serious and that their financial condition would have to be "radically changed,"¹⁶⁴ in order to enable them rightly to serve the community.

These recommendations, although in large part neglected, had some important effects. The Company was commonly

¹⁶⁰ Opinion and Order, 1927, p. 7, also pp. 4, 9, and Hearing of 1927, pp. 105, 106, 593, 594. The figures given in Beeler, "Plan for Local Transportation," p. 65, furnish ground for the position taken by the Commission. Again, pare down by one-half any alleged deficit for a year later than 1922, as shown in Table X, then deduct from the remaining half \$150,000 for taxes unduly charged to the railways (p. 43). The result would still be no small deficits for the years 1924, 1925 and 1926. Protestants and others who did not share the responsibility for the railways disputed the soundness of these conclusions. Shall the writer join with them or remind himself of what Yarros says of the "Familiar notion . . . that 'the people' are just, square, altru-

istic, reasonable, while 'the rulers' (here the Public Service Commission) are almost invariably tricky, selfish, predatory, arrogant?" 27 *American Journal of Sociology* 215 (September, 1921).

¹⁶¹ Opinion and Order, 1927, pp. 4, 9.

¹⁶² Coffin Award Presentation, p. 118. Cf. Hearing of 1927, pp. 589-90.

¹⁶³ Hearing of 1927, pp. 11, 12. Cf. *Atlanta Journal*, May 16, 20, 24, 1923.

¹⁶⁴ Beeler, *op. cit.* Cf. Opinion and Order, 1927, pp. 3, 4, 6, 7, and Hearing of 1927, pp. 14, 15, 65, 68.

regarded as potent in helping itself, hence its S. O. S. call tended to fall upon deaf ears. However, the City did take a hand in the cost-saving measures of the railways which have already been mentioned.¹⁶⁵ Added to these in 1925 were the abolition of jitney competition and the permission given by the Town of College Park to replace its contract fare with the regular city fare. But the effects of all these taken together did not suffice to restore the lost balance in the accounts. Finally, after seven years, and without the support of the municipal government, the Commission was asked again to raise the fares. In preparing for the hearings an optimistic Company official forecasted "no general sentiment of opposition."¹⁶⁶ When the hearings were held, however, the most voluminous testimony yet heard on the fare question was evoked.

The Third Fare Case.

The applicant presented a case similar to the previous ones. With all the force at command it emphasized cost factors, high levels of prices, sparseness of traffic, deficits, desirability of fair valuation of properties as a basis for rates and necessity of placing the railways on a self-sustaining basis. Facts were presented in formidable array,¹⁶⁷ and their convincing character is attested by the evident difficulties besetting a leading witness, and subsequently a leading attorney, of the opposition in taking the

testimony. Nevertheless, a great amount of opposing testimony was presented. It called attention to five-cent and six-cent fares in certain northern cities; it contended that excessive capitalization, or unreasonably high valuations of visible properties, had been accepted as bases for rates by the Commission in the past and were being offered again for the purpose of determining the decision on this application, and claimed that,¹⁶⁸ should the railway and the other properties be treated as whole, the Company would be found to be already earning a reasonable return.¹⁶⁹ Finally, this side alleged that the excellent, "highly maintained . . . roadway and equipment" were evidence of the railway's prosperity.¹⁷⁰

In spite of much argument the Commission's course seemed again charted clearly. It decisively rejected the attempt to apologize for inadequate car fares by saying that the Company as a whole was earning reasonable returns. It said, "the street railway property should henceforth bear its own burdens."¹⁷¹ It reiterated its uniform practice of using as a basis for rates, not capitalization, but valuation of physical properties,¹⁷² and explained that the high condition per cent of properties and excellence of equipment were made possible by funds not derived from earnings.¹⁷³ It stated further that, when the adjustment of 1920 was effected, the ensuing trend of general prices could not be foreseen and admitted that the seven-

¹⁶⁵ *Supra*, pp., 282-283.

¹⁶⁶ Coffin Award Presentation, p. 122.

¹⁶⁷ Hearing of 1927, pp. 60-64, also pp. 103, 105, 106, 593, 594.

¹⁶⁸ *Ibid.*, pp. 508, 654, 657, 658, 662, 666, and Opinion and Order, 1927, pp. 5, 6, Exhibit No. 14 shows that the proposed rates were designed to yield a 6% return on a valuation of \$25,835,039, including jointly used properties.

¹⁶⁹ Opinion and Order, 1927, p. 4. Cf. Hearing of 1927, pp. 688, 694, 1082. Also p. 610, Manget's com-

plaint about the planned filling of the coffers of the "rich corporation" by the new rates. Also p. 694, admission from Attorney for Atlanta of no ground to support contention for treating all the utilities as a whole instead of basing separate rates for each on its costs.

¹⁷⁰ Opinion and Order, 1927, pp. 7, 8, and Hearing of 1927, p. 325.

¹⁷¹ Opinion and Order, 1927, p. 7.

¹⁷² *Ibid.*, pp. 5, 6.

¹⁷³ *Ibid.*, pp. 7, 8.

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174 *Ibid.*

175 *Ibid.*

176 *Ibid.*

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cent rate was lower than the evidence then submitted seemed to justify. With respect to what followed it said, "Instead of a restoration of pre-War prices of labor and material, there has resulted what appears to be . . . a stabilization of prices at a much higher level than obtained prior to the War."¹⁷⁴

As a consequence, money costs of operation rested upon a permanently higher level, and revenues from the available traffic were inadequate to cover them. For nine years patrons had enjoyed service at rates that were not compensatory. Such rates were too low. Two hundred and eight cities had already adopted the 10-cent fare. If adopted in Atlanta, movement by street railway would still be cheaper than any other transportation obtainable. The Company merited relief and the remedy was to raise the fares. A 10-cent fare for single rides was advocated even by opposition witnesses. Therefore, a new schedule, which is still in force, prescribed a cash fare of 10 cents, ticket fares four for 30 cents, and for school children 20 tickets for \$1.00.¹⁷⁵

Under the new schedule for 1928 the gross income was \$5,362,744; operating expenses \$3,289,016; and operating ratio 68.24%. In producing this result the fares were no doubt aided by the partial recovery from the southeastern sectional business slump of 1926-1927.

Conclusion

The fares on the Atlanta street railways, although at first high, were later reduced to, and more recently raised above, the five-cent level. In general, the principle of the flat fare has been adhered to and the burden on patrons, despite its

apparently unchanging quantity, has varied with changes of price levels, rising if prices and money wages fell and falling as they rose. For many years before 1919 the fares were held at five cents and, since prices were rising in 1898-1919, the patron found in the purchase of street car service an increasing advantage. This consumer's surplus was in part offset in 1919 by the advance to six cents of all rates except those on two lines leading to contract-fare zones and much more by the further advance of these same rates to seven cents on the eve (1920) of the grand slump of post-war prices. "The present status of the consumer's advantage from the level of fares is indicated by the fact that, owing to the use of tokens, about 85% of the patrons pay a seven-and-a-half cent fare with prices about 50% above the 1913 level." This 85% of car users today get "from present fares the same proportionate advantage obtained from the five-cent fare in 1913."¹⁷⁶ The other 15% pay the 10-cent rate and receive proportionately less of advantage.¹⁷⁶

On the investors' and management's side, several different factors influenced in varying degrees the fare problem. Chief among these were maintenance of properties, adequacy of capital funds, the cost-earnings ratio, flat fares and contract fares, motor-car competition, and the fiscal demands of the cities.

Early competitive ventures in the community resulted in a rapid multiplication of light railway facilities. This competition, however, was brought to an end by the consolidation of all lines into one system in 1902, and under the new control an improved order was intro-

rise, the advantage increases; if they fall, it decreases, provided fares remain unchanged.

¹⁷⁴ *Ibid.*, p. 6.

¹⁷⁵ *Ibid.*, pp. 10, 11, 12.

^{176a} Continuous enjoyment of this advantage is dependent on maintenance of the general level of prices and of money incomes of patrons. If prices and incomes

¹⁷⁶ This calculation has left out of account the five-cent contract-fare passengers who, of course, receive a consumer's advantage.

duced into the processes of extension and expansion. In the disturbed war period the properties were temporarily neglected and the condition per cent allowed to fall, but once that period was over, the policies of improvement and development were again resumed and the condition per cent raised to such an extent that the physical properties have been lauded as excellent. Moreover, the management has operated cars which have, except in rush hours, afforded much space not occupied by passengers.

Although the promoters of the early street railways found means to launch their projects, several of their ventures were financially wrecked before a sound basis of conducting the business was reached. As the population of the community grew, traffic increased and increasingly expensive structures were required to handle it. As a consequence, larger amounts of capital per mile of track had to be raised and greatly increased debt obligations resulted. Nevertheless, the earnings of the monopoly under conservative management supported well the financial structure until the era of the world war. In the war period increased prices caused expenses to gain greatly upon receipts, produced a relative shortage of earned funds, weakened the credit line of the whole Company, and temporarily lessened its facility in borrowing capital. The passing of the peak of prices was, however, followed by financial outlays which in character and size were unprecedented in any like term of the railway's history.

In the long run both the adequacy of capital funds and the development of physical properties depended upon net returns from the business and net returns upon the ratio of costs to earnings. Holding in mind the flat-fare schedule of charges, it suffices here, without restating the facts as to costs, to make the follow-

ing statements: Traffic densities varied not only as between different lines, but also as between different portions of the same line and as between different hours of the day on given portions of some lines. Costs of operating individual cars in their turn varied mainly with the distances covered, those of a well-filled car being but little more than those of one bearing a single passenger. The costs per passenger in the former, however, were much less than in the latter, and yet in making the choice between flat fares and graded fares these facts were not given that weight which justice apparently would have allowed. A source of further inequality was found in the five-cent contract fares, notwithstanding that in 1923 one of the contract lines earned a surplus over operating costs. These variations in densities of traffic, and not the levels of fares, as seven cents or five cents, were largely responsible for the maladjustment of revenues to costs which appears from comparison of financial returns of different lines. Such comparison reveals that in general the lines of higher average densities had low operating ratios and as a consequence yielded surpluses, while those of low densities had high operating ratios and yielded deficits.¹⁷⁷ In 1923, 10 lines yielded deficits, the aggregate of which, when

¹⁷⁷ Assuming that revenue per car mile is a fair index of density, Nos. 1 and 7 below showed nearly equal densities, but one earned a surplus and the other a deficit. Density alone did not decide the issue.

OPERATING STATISTICS IN CENTS PER CAR MILE.*

Line	Operating Revenue	Operating Deductions	Net from Operations
1. Decatur-Marietta.....	35.46	37.65	D2.19
2. Courtland-Woodward...	31.78	40.63	D8.85
3. Cooper-Richardson....	36.05	45.27	D9.22
4. Pine-McDaniel.....	36.07	40.43	D4.36
5. Main-Decatur.....	29.18	24.96	4.22
6. Stewart Avenue.....	29.88	33.94	D4.06
7. English Avenue-Soldiers' Home.....	35.49	32.67	2.82
8. Buckhead-Oglethorpe..	31.39	24.26	7.33

*Data from Beeler, "Plan for Local Transportation," p. 93.

subtracted from the total surpluses of the other lines, left a residue insufficient to pay normal returns upon the officially estimated capital investment in the whole system.¹⁷⁸

The establishment of the flat fare in Atlanta was in line with widespread practice in other cities. Once established on some car lines in the City, competition forced its spread to the rest, and after the monopoly stage was reached, other newly acting causes hindered any attempt to change it. Chief among these hindrances, no doubt, was the attitude of the General Assembly of Georgia which took from the owners of the railways such rate-making powers as they once had and vested them in the Railroad Commission. But this attitude was in part based upon the opinion that flat rates tended to equalize the advantages of living in different parts of the metropolitan area and therefore to decentralization of population. These considerations were sociological and philanthropic, aimed at the welfare of patrons of the railways. If we allow them sufficient weight in the debate as to methods of promoting welfare, the flat-fare structure can be defended. Such defense affords a grain of comfort to favored patrons and also to holders of real estate lying within easy reach of light traffic sections of the car lines, because it upholds each of them in receiving a virtual subsidy at the expense of other patrons of the railways. But it minimizes the importance of those varying specific costs to which business men and economists devote much attention.

Akin to this are the results of the surviving five-cent contract fares. Now the Company has claimed that these fares are not compensatory. The *Beeler Report*, however, shows that in 1923 the Main-Decatur line, a contract-fare line, earned \$35,000 more than its operating expenses. Assuming that 1923 was a representative year, reconciliation of the Company's claim with this fact is possible, if not more than 50% of the traffic on the line was five-cent traffic, because the difference between the earnings on this traffic and on that which paid the higher rate, then approximately seven cents, probably exceeded the \$35,000 surplus by a good margin.¹⁷⁹ However this may be, there are on this line today two classes of passengers who use the same cars almost in common and yet are distinct. For instance, (1) those in Class I do, and those in Class II do not, enter or leave cars in a zone east of Greenwood Station in Decatur; (2) of the two those in Class II, who are mainly residents of intermediate territory, ride shorter distances and therefore cause the railway less cost for their service, and yet (3) they pay at present seven-and-a-half-cent token or 10-cent cash fares, as against the five cents paid by Class I. Under these arrangements the discrimination is twofold, viz., a two-and-one-half-cent (33 1/3%) differential in the fare and a larger quantum of service, both favoring the Class I passengers. Thus, a Class I rider fails by two and a half cents, or more, to contribute as much to upkeep and general expenses of the service as does a Class II rider and

¹⁷⁸ Stockholders have long groaned about the need of putting the railways on a self-sustaining basis. A drift in that direction is indicated in the financial returns since the fare adjustment of 1927. (See *Auditor's Report* for 1927-1928, March, 1929, and Table IX, *supra*, p. 284.)

¹⁷⁹ A Company official states that probably as much as 50% of this line's traffic has been five-cent traffic. The

line's gross receipts, as reported by Beeler for 1923, were \$244,000. If 50% of the traffic was carried at each rate, seven cents and five cents, 7/12 of the gross or \$142,000 was earned by the one and 5/12 or \$101,000 by the other. The difference, \$41,000, between the two exceeds the surplus by about 16% and makes it appear that the receipts from the seven-cent traffic helped a little to pay the expense of the other.

thereby tends to depress revenue and cause deficit in returns on invested capital. In this way the service to and from the contract-fare zone is virtually subsidized and residence in the parts of Decatur accessible to it is also subsidized¹⁸⁰ to the extent that it and the rents affected thereby depend upon the favor of discriminatory car fares to and from Atlanta. Moreover, the incidence of the cost of this subsidy seems to be upon the patrons who pay the higher rates, or to be divided between them and the shareholders of the Company, provided the latter have not received fair minimum dividends on their holdings.

¹⁸⁰ A series of events of the year 1929 elicited an implied appreciation of this fact. The General Assembly of Georgia enacted a Motor Carriers Act whose chief provision was that after July 1, 1929, authority to maintain a motor passenger service in the State was to be had only after grant by the Public Service Commission upon proof that public convenience and necessity required it.

Before July 1, viz., on June 22, the Inter-City Coach Lines, Inc., had begun to operate a bus line between Decatur and Atlanta. Up to July 1 it carried passengers varying in number from 6 to 39 per day, and it continued to operate thereafter until called before the Commission to prove its right to operate under the new statute.

As the service in question was already in existence when the statute first took effect, the Company claimed a "preference," i. e., that it was not required to obtain the certificate of "convenience and necessity."

The Commission, however, found other grounds on which to base its ruling. It held that the smallness of the service rendered before July 1 was such as to fail "to impress any one" that it was intended in "good faith to establish and maintain adequate service in the form of reasonable transportation facilities for the many thousand people transported daily between said cities. An approximate number thus transported daily in twenty-four hours is 17,000." It held further that in order to determine "the question of good faith in establishing adequate service in the transportation of the general public, one of the essentials is the ability and opportunity afforded in the conduct of such a business . . . The applicant was in no wise prepared to provide adequate service" for those who were expected to use its facilities.

Furthermore, there was objection to the route selected for this line. It traversed certain congested streets in down-town Atlanta, passed through street intersections at which the street railway cars regularly received and discharged large numbers of passengers, and followed

The income of the railways has also been affected by the competition of the motor car for traffic and by the fiscal demands of the municipalities, especially Atlanta. The competition of the motor car was a competition between methods of movement, not mainly a business-enterprise competition. The motor car rose to prominence just about the time the railways felt most keenly the effects of high prices and its use has grown more rapidly than population. It has served as taxi, bus, jitney and private car, the last two having been most effective in diverting traffic from the railways. Upon the whole these two have moved an appreciable portion of the street traffic¹⁸¹

for the most part ways that were already used by the street railways. The result of this was to duplicate service already being offered. The new law, looking to the public interest in continuous, dependable service, was designed to prevent needless duplication, because its inevitable result was to lessen the financial strength of and to weaken the established dependable service and in the end to throw a burden of loss upon the public. Therefore, it was the duty of the Commission to refuse permission for such duplication.

But in the case of operation from the intersection of Ponce de Leon Avenue with Clifton Road to the Court House in Decatur, and also on two other short routes named, no such duplication was found and objection on that account was not raised.

The Commission also stated that the North Decatur Street Car Line of the Georgia Power Company had "for several years . . . failed to take in sufficient revenue to pay the actual operating expenses" because of the five-cent contract fare that favored part of its traffic. (*Minutes of Public Service Commission*, vol. 9, pp. 263, 264, 267. Cf. *United States Daily*, p. 9, October 26, 1929, and *Georgia Laws*, 1929, No. 424.)

¹⁸¹ The following table gives reported figures and estimates of the chief vehicular movement of traffic in the streets in three different years:*

Year	Fare-Paying Passengers Carried By			Probable Traffic of Street Railways without Motor Car Competition	Rate Charged Patrons of Railways	Estimated Loss of Revenue to Street Railways (Totals)
	Street Railways	Jitneys	Private Motor Cars			
1926	75,900,000	None	28,900,000	104,800,000	7 cts.	\$1,967,000
1924	72,500,000	7,750,000	17,000,000	97,250,000	7 cts.	1,732,000
1920	77,284,000	3,500,000	8,500,000	89,284,000	6 cts.	719,000

* The left-hand column and the figure for the year 1924 in the next column are taken from Beeler, "Plan for Local Transportation." The other figures are furnished by cour-

(Footnote 181 continued on page 298)

and have taken a portion of receipts which otherwise would have fallen to the railways. Meanwhile, the capacity of the railways was maintained at such a point that they could, without adding greatly to their expenses, have handled both the traffic they actually got and an equivalent of all that fell to the motor cars; and since the revenues they were receiving exceeded operating expenses, the increments from the added traffic would have been largely clear gain. The accretion of such receipts would have been an undoubted advantage and have gone far to remove the causes of complaint about earnings, in the last rate hearing at least.

This competitive curtailment of earnings occurred chiefly in the present decade. Of earlier origin than that was the municipal policy of claiming as public revenue portions of the earnings of the utility. The concern of railway owners, municipal authorities and citizens about the matter was such that we state here the position of each. The railways, in common with other holders of city property, bore the general property tax and sanitary tax, as a business concern paid the license tax and as a corporation the franchise tax. Pursuant to the consolidation ordinance they also paid the tax on gross receipts whose rate after 1925 was 3%; but from this 3%, deductions were allowed for payment of the sanitary, license, and franchise taxes. Finally, they paid the trackway paving assessments. All told the payments constituted a cost burden for which pro-

vision had to be made as certainly as that for ordinary expenses.

From the other point of view, however, the levies, notably the gross receipts tax and paving assessments, resulted in getting funds to pay public obligations. To the City Council the gross receipts tax saved the trouble of finding other means of raising some tens of thousands of dollars a year from the citizens. And to owners of land abutting on streets whose pavement was partly paid for by the railways a saving also accrued¹⁸² but one whose equivalent had to be made up to the paving contractor out of railway funds derived either from earnings or capital.

Now if the people understood, and as a consequence of understanding, preferred to pay these sums into the treasury through the channel of the railways, their choice is entitled to respect. "But the use of the railway as a 'tax-collector' is not easily defended," if in lean years it resulted in denying to invested capital net returns below those accruing on other capital. "Indeed this policy tends to defeat itself when it causes deteriorated equipment and service. In Atlanta a lightening of these municipal burdens would have materially lessened the force of the applications for increased fares."

As recounted above, the price disturbance and cost behavior during the last decade raised a presumption in favor of bringing car fares into line with other prices. The propriety of accepting or rejecting this presumption as a basis for action depended upon the "equities" of the case. To reject it, for instance, would

(Footnote 181 continued from page 292)

tesy of the Assistant to Vice-President (Manager) of the Railways, who in submitting them has the following to say in part: "To determine the actual number of revenue passengers lost to private motor cars is almost impossible. Any . . . estimate on this would be questioned. I have, however, shown . . . the number that seems to be reasonable after a study of the street railway business, population figures, and automobile registration for the years involved. I feel that the figures shown are quite conservative and realize that the number of . . . passengers that are using private motor cars may be considerably greater than shown by my figures." Comparison of the figures in the right hand column with those of gross earnings of the railways, as shown in Table VI,

leads inevitably to the conclusion that the motor car has been an important factor in the situation, and that even a liberal paring down of the estimates given would still have left them an important factor.

¹⁸² Incidentally the Company's paying for a strip of pavement 11 feet or 16 feet wide had a discriminatory effect. In a street 40 feet wide it relieved property owners of 27.5% or 40% of the burden borne by owners in sections not reached by car line.

seem to require proof of one or other of two propositions: (1) that before the price revolution the fares had been unwarrantably high and that maintaining them at the old levels, while other prices were rising, tended to correct the disparity; or (2) that the railways were able to absorb their increased money costs without either increased fares or undue financial deprivation. In the rate hearings there was much thrumming, partly by persons not conversant with the principles of rate-making, as if weighty reasons for opposing any increase at all were about to be divulged. As seen by the Commission, these reasons were not made to appear. The Commission's stand has been criticised as having shown a preference for reproduction cost of properties in establishing valuations for rate-making. It is hardly necessary here to restate contentions as to the theory of valuation, but if the Commission's stand in that regard was well-grounded, there was reason for advancing the rates in 1919, 1920 and 1927.

MEASUREMENT OF RISK IN PUBLIC UTILITY INDUSTRIES

By JOHN F. REINBOTH

THE first article¹ presented the general theory that, if a group of bonds was selected in which the possibility of loss to investors was practically negligible (such as the highest grade government or municipal bonds), the difference between the average yield on these bonds and on the highest grade bonds of other industrial groups would measure the degree of inescapable risk inherent in these other industries.

The risk element was isolated for measurement by eliminating the other two components of the interest payment: wages of management and reward for waiting. The wages-of-management element was eliminated by selecting the very highest grade (lowest yield) issues which each group could furnish; the reward-for-waiting component, sometimes referred to as "pure" or "net" interest, was eliminated by using the average yield of a group of practically riskless bonds as a common base from which to measure the difference in yield between them and the industrial groups and, consequently, between these groups themselves.² This difference in yield between riskless bonds and the very best bonds of other groups is assumed to be a measure of the minimum degree of inescapable risk involved in the operations of each of the industries studied. After outlining some of the technical problems and features of statistical methodology involved in computing average yields rep-

resentative of the various groups, this article will present the differences in yield, which constitute a measurement of fundamental industrial risk, and describe some long-time and short-time variations in risk over the period studied.

Statistical Methodology

Some of the special problems encountered in computing an average yield typical of the highest-grade bonds and the statistical technique developed for their solution may be described briefly. Since problems of theory and method involved in selecting the individual issues to be included in this study were presented in the earlier article, it remains here to discuss only the methods employed in selecting the group of issues to be used in the computation of the typical yields for the several classes of bonds.

Municipal Bonds. To avoid the influence of spurious fluctuations of yield and to approach more closely the typical *minimum* yield of municipal bonds, only the lowest 10 of the 11 bond yields finally chosen were averaged each month. The same city was sometimes highest for several months in succession, and therefore was eliminated; it then reverted toward the general average and another city took its place; or during other periods, a different city was eliminated each month.

This method reduced the influence of random variations in yield resulting from

¹ *Journal of Land & Public Utility Economics* 83-93 (February, 1930). Tables in present article are numbered consecutively with those in first paper.

² Obviously, if risk and wages of management are negligible in municipal bonds as a class, and if the very

highest grade municipal bonds are chosen, the interest payment on such municipal bonds is mainly compensation for waiting and, therefore, the yield of these bonds may be used as a base from which to measure risk and wages of management in the other groups. See earlier article for further discussion of the procedure followed.

fluctuations in the risk and wages-of-management components of the interest payment on municipal bonds. Therefore, the average of the lowest 10 yields constituted an approximate measurement of the compensation for waiting which was used as a base from which to measure the amount of risk in the industrial groups.

The lowest one or two yields of the group might have been eliminated each month along with the highest one or two and an average of, say, the middle seven yields used as the typical. This method was used in the electric railway and combined electric light and power and electric railway groups where the dispersion between yields was wide and a median average yield was desired to represent the group. It was not employed with the municipal bonds because the dispersion among yields was very narrow and, also, a representative *minimum* average yield was desired to serve as a base from which to measure the element of risk.

With equal logic the two or three municipal bonds highest in yield might have been discarded entirely, but their yields could not have been used in the average when they were typical. Instead, partial rejection of these yields only at the times when they were high seemed preferable to complete rejection of part or all of them during the entire period.³

A comparison of this group of 10 municipal bond yields with Standard Statistics' group of 15 and the Bond Buyer's group of 20 indicates that the average yield of this group of 10 is consistently lower than that of either of the other two groups; therefore, the risk element is present to a less degree in the group of 10 than in the other groups which might have been used.

³ See section on General Comments, *infra*, p. 297.

⁴ See W. Floyd Maxwell and Ada M. Matthews, "A Monthly Index of Bond Yields, 1919-1923," *The*

Steam Railroad Bonds. Steam railroad bonds have been studied perhaps more than any other group and, thus, a number of group averages were available for comparison. The highest-grade issues in Harvard University's revised group of 10⁴ and Standard Statistics' group of 15 were analyzed carefully and the 10 lowest-yield issues selected as a starting point, all having an Aaa Moody rating during the 20 years. The average quarterly yields of this group of 10 were consistently lower than either of the other two groups. The dispersion was narrow and, therefore, all 10 issues were used in computing the group averages.

Telephone and Telegraph Bonds. Five of the lowest-yield issues were selected, all from more or less allied companies which, however, constitute by far the greater portion of the industry. The concentration of yields was sufficiently high so that an average of all five issues was representative of the group.

Industrial Bonds. The average yield of a group of high-grade industrial bonds was introduced for comparative purposes. The number of issues in this field is large and the comparison only incidental to the present study of public utility bond issues as a measure of risk, so the Standard Statistics' average of a group of 15 high-grade industrial bond yields was used without analysis or modification.

Electric Railways. Selection of issues to represent the electric railway industry was not easy. The range between the yields of the various issues was wide, especially in the middle years, thus making desirable a larger number of issues in the sample group, as well as the elimination of the highest and lowest issue each month before computing the average of the five median yields.

Review of Economic Statistics (Harvard Economic Service), Prel. Vol. 5, No. 3, pp. 213-214 (July, 1923).

Combined Electric Light and Power and Electric Railways. This mixed group of bond yields presented even greater difficulties of selection than did the electric railway issues. For example, during the early period one issue may have been secured by fixed plant and equipment used mainly in electric light and power service and to only a small extent in electric railway service, or vice versa. During the following 20 years this company may have acquired additional electric light and power properties, or disposed of part of its electric railway business, or both, thus changing the character of the assets behind the bond issue and perhaps its yield. Mergers or affiliations with a holding company also tend to confuse the significance of long-time changes in yield as a measure of variations in risk in these mixed utility services. For these reasons this group is considered individually and is not combined with either the electric light and power or electric railway groups. The dispersion of the yields of the 10 issues was great and, therefore, the two highest and two lowest yields were eliminated each month, and the middle six averaged to obtain a representative yield for the group.

General. The above method of elimination was employed as a statistical short-cut in approximating the modal average which, of course, would have been preferable (except in the municipal group where a minimum average was desired) had it not been so impractical to compute. As a test of the validity of this method of securing representative group averages, actual modal averages were computed for several periods in which the dispersion of yields was widest. The result was a small variation between the two methods, which was inconsequential when the dispersion of yields was normal. The purpose and the results seem to justify the method.

Probably some errors of judgment were made in selecting the issues, even though the various criteria of selection mentioned here and in the previous article were constantly kept in mind and care was exercised in computing average monthly yields which would be representative of the highest-grade bonds of each industry. Since these monthly yields were averaged to obtain quarterly yields for each group, the possibility of any error of sufficient magnitude to invalidate the general conclusions of this investigation is very slight.

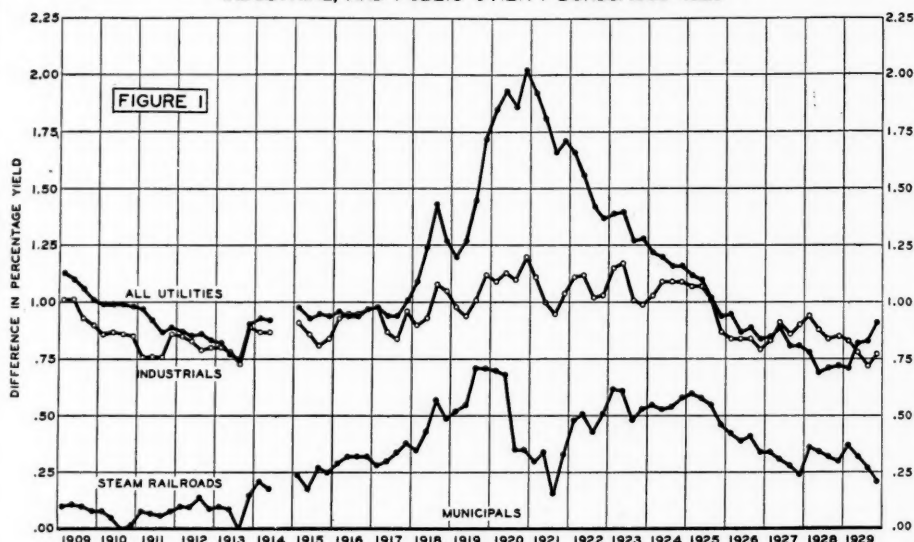
Trends in the Measurement of Risk

Two methods of measuring risk were tried: (1) calculation of the *actual differences* in yield between municipal bonds used as a base and the highest grade bonds of steam railroads, industrials, and an average of six public utility industries, viz., (a) telephone and telegraph, (b) electric light and power, (c) gas, (d) combined electric light and power and gas, (e) electric railways, and (f) combined electric light and power and electric railways; (2) calculation of the *ratio* or *percentage differences* between municipal bonds and each of the above groups.

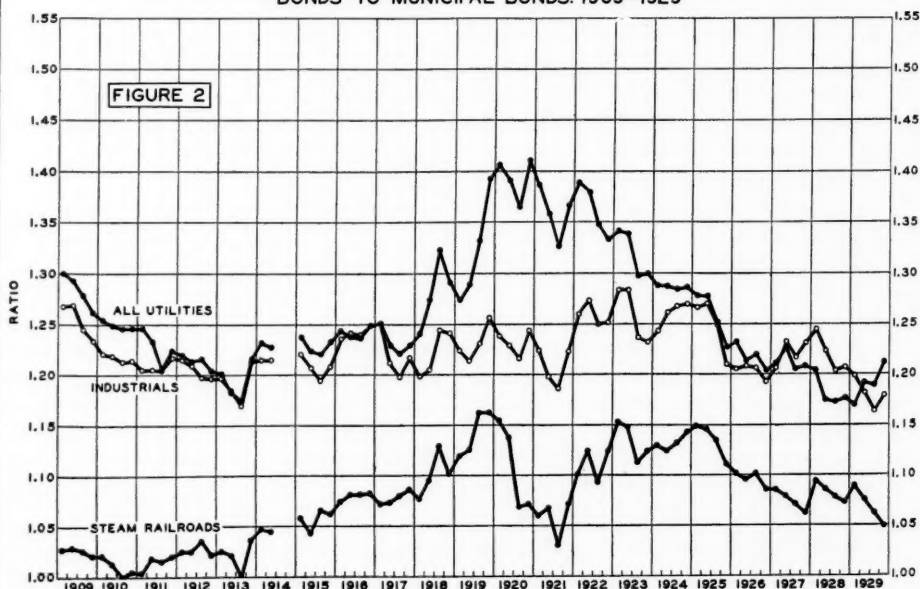
Because of the greater sensitiveness of the *ratio-difference* comparison to changes in the base (municipal) group and because of space limitations the results of this method are presented in greater completeness than those of the *actual-difference* calculations. Chart II (Figure 1) presents the data on the *actual-difference* comparison for steam railroads, industrials, and the all-utility group. Chart II (Figure 2) and Chart III, together with Table IV, present the same information calculated on a *ratio-difference* basis and carry the method farther to an analysis of the six separate industries included in the all-utility group. The description in

CHART II

DIFFERENCE IN PERCENTAGE YIELD BETWEEN HIGH GRADE MUNICIPAL, STEAM RAILROAD INDUSTRIAL, AND PUBLIC UTILITY BONDS: 1909-1929*



RATIOS OF YIELDS ON PUBLIC UTILITY INDUSTRIAL AND STEAM RAILROAD BONDS TO MUNICIPAL BONDS: 1909-1929



*Stock exchange closed, third and fourth quarters, 1914

the text will follow the *ratio-difference* charts, except where reference to the *actual-differences* is specified.

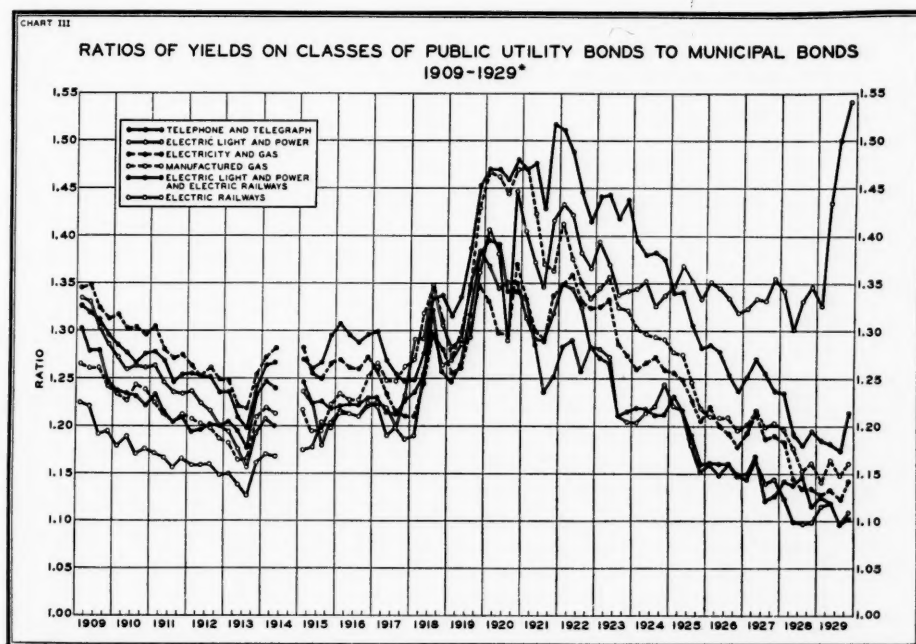
Certain points concerning the interpretation of these charts should be mentioned. The curves on these charts trace the risk history of the several groups of industries and, when a particular curve declines, it signifies that risk in that industry is declining. But declining risk means an improved credit position of that industry; hence the difficulty of associating improvement with a descending curve. Confusion will be avoided, however, by bearing in mind that a *declining curve* means *declining risk*.

Furthermore, it should be remembered that only the very highest grade issues were selected in each industry—not even the typical, or average, or generally representative issues—but the very best. The group yields indicate, therefore, the *minimum* amount which the very

best firms in each industry paid for borrowed money during the past 20 years. The absolute and, better still, the ratio differences between these yields and the yield on the best municipal bonds represent the fundamental risk present in each industry which even the strongest firms could not escape in carrying on their business.

In all economic investigations it is important to distinguish between tendencies and influences, results and reasons, effects and causes. Since the results of this investigation are open to a variety of possible and plausible explanations, the following discussion will be confined mainly to a *description* of the long-time and short-time tendencies of the risk element in the industries analyzed.

The data on which this study is based reflect only indirectly, through the bond markets, the economic influences operating within a particular industry. In



*Stock exchange closed, third and fourth quarters, 1914.

general, the assumption is that developments within any industry financed largely by the investing public are sooner or later recognized by these investors and thus affect the cost to the industry of obtaining long-time credit. However, to the extent that conditions peculiar to the money market itself are operating from time to time, the data will not truly reflect the influences which it is desired to measure.

Among the influences peculiar to the money market may be mentioned shifts in the fashion of disposing of accumulated savings, such as buying securities directly, savings bank accounts, building and loan associations, and insurance, much of which indirectly reaches the security markets; withdrawal of funds for consumption purposes; the supply of new capital accumulated in proportion to the demand for it; the character of the demand for funds in relation to the character of the supply, i. e., short-time and long-time, the proportion of bonds to stock, the proportion of railroad, municipal, industrial, and public utility bonds and stock, and real estate and domestic and foreign government bonds to the total of each and the grand total of all. These are diverse, complex factors difficult to evaluate at any time, and hence are left to the reader's discretion in interpreting the results of this study.

Long-Time Tendencies in Risk

It is apparent from Charts II and III that a smaller degree of risk is inherent in the operations of the steam railroad industry than in the so-called industrial or the other public utility groups. However, over the two decades a clearly defined tendency may be noted for fun-

damental risk to increase in the steam railroad industry. On the other hand, most of the public utility industries have shown a marked tendency for the amount of inescapable risk involved in their operations to decrease, especially in the past decade, while risk in the non-utility industries has remained fairly constant over the same period. Particularly in the last few years have the public utilities approached more closely the risk level of steam railroads than at any time in the period under review.

These tendencies are more apparent if index numbers of the percentage differences in yield above municipals are computed for each group, using the pre-war period (1909-1914) as the basis of comparison, or 100%.⁵

The results of the computation of such indexes are similar to those revealed by the charts. The variations between the two are largely attributable to the difference in the two bases used. The addition of the index-number measurement, however, facilitates comparison of the risk positions of the several industries and and their more accurate description. Thus the annual percentage change above or below the index of risk for the period 1909-1914 indicates the degree of increase or decrease in risk in each industry relative to its average level during the base period.

These annual index numbers are not reproduced here because of their close similarity to the charted material. They were used, however, as the basis for constructing Table III, which shows the relative risk positions of the several industries in 1929 and 1928 with reference to their situations in the pre-war period. In other words, increment or decrement of risk is expressed as a percentage of the

⁵ These 5 ½ pre-war years were used as the base period because they were comparatively free from major fluctuations resulting from disruptive changes such as were brought on later by the war. A group of years was

selected rather than any single year (e. g., 1909), in order that the broader base might reduce the effect of minor variations in a particular year.

1909-1914 base and these percentages determine the risk-rankings of the separate industries in the last two years relative to their pre-war positions.

Comparing the public utility groups individually in 1929 with their pre-war levels, the outstanding feature is the complete reversal in credit position of both electric railways and steam railroads from their strong pre-war position to the weakest rating in the last two years.

TABLE III. PERCENTAGE CHANGE IN RISK* COMPARED TO 1909-1914 LEVEL

Classes of Bonds	Change in Risk		Ranking		
	1929	1928	1929	1928	1909-1914
Electric Light and Power and Gas....	-11.9%	-10.5%	1	2	10
Electric Light and Power.....	-10.5	-11.0	2	1	7
Telephone and Telegraph.....	-9.5	-7.4	3	4	5
Combined: Electric Light and Power; Gas; Electric Light and Power and Gas	-9.2	-8.5	4	3	8
Electric Light and Power; Electric Railways.....	-5.9	-5.1	5	5	9
Manufactured Gas.....	-5.2	-3.9	6	7	4
All Utilities Combined.....	-3.4	-4.3	7	6	6
Industrials.....	-2.7	+0.4	8	8	3
Steam Railroads.....	+4.4	+5.9	9	9	1
Electric Railways.....	+24.0	+13.7	10	10	2

*Based on percentage difference between 1929 average municipal bond yields and each of the groups listed.

These are the only groups which clearly have shown no improvement; indeed, are in a worse position.⁶ To be sure, these two transportation industries in the pre-war period enjoyed the best credit of any of the industries studied, even better than the industrials, and this may explain in part why they occupy such a comparatively poor position now. But they have gone so far in the opposite direction that causes other than statistical must be largely responsible for the definite upward trend of risk.

The effect of expansion and prosperity in the electricity market is obvious. The

⁶ Throughout the discussion, when reference is made to the fact of increasing risk in the steam railroad industry and its poor position relative to the early part of the period, it should be remembered that in spite of this decline the industry is still in a more favorable risk position than the other industries represented.

combined electric light and power and gas industry improved the most, followed by the electric light and power, telephone and telegraph, combined electric light and power and electric railways, and gas industries.

It is interesting to note that the electric light and power group, which in 1928 ranked first in reduction of risk, yielded the lead to the electricity and gas group in 1929. Similarly, comparing rank in 1928 and 1929, telephone and telegraph bonds displaced the combined groups representing the electricity and gas industries in third place, and the gas industry took sixth rank from the all-utilities group. This reversal of trend in the all-utilities group was caused almost entirely by the very much poorer credit position of the electric railway industry and, in the last quarter, to some extent by the increased risk in the combined electric light and power and electric railway group.

Short-Time Tendencies

For convenience of analysis, the 20-year period is divided into four parts: 1909-1913, 1914-1917, 1918-1920, and 1921 to date.

1909-1914. This pre-war period was characterized by narrow fluctuations in risk in all groups. The steam railroads were in their best position, evidencing very little risk, and during two quarterly periods none at all.⁷ The industrials were subject to less risk than the utilities; both groups were improving during most of the period, but definitely increased in risk during the last quarter.

The older public utility industries, such as the electric-railway, gas, and

⁷ It is conceivable that railroad bonds, during short periods, may yield even less than municipals as a result of wider marketability, which is probably more important during periods of financial stress than during business prosperity.

telephone-and-telegraph groups, were in stronger positions prior to the war than the then newer public utility services. During this period electric railways, like steam railroads, enjoyed their least amount of industrial risk. In the last year (1913) the electric light and power industry began to be recognized and gained a better relative position, comparable to the gas and telephone and telegraph groups, and was exceeded in security only by the electric railways.

1915-1917. The steam railroads continued the rising trend of risk which began the latter part of the first period and reached its peak in the third. The industrials fluctuated more than the average of all utilities, which were very stable during these three years. The drop in the industrials in 1915 occurred soon after the war broke out in Europe, and the second drop in 1917 came soon after the United States entered the conflict. While the industrials remained below the all-utilities average most of the time, the telephone and telegraph, electric light and power, and electric railway averages were below the industrials during the middle portion of the period.

1918-1920. During the war years, and those immediately following, greater changes occurred in less time than during any other portion of the 20 years. The tendency of the steam railroads to increase in risk culminated in 1919-1920, but was followed by a sudden and substantial improvement during which they almost reached their pre-war levels of comparative freedom from risk in the third quarter of the following year.

The most outstanding characteristic of this period is the relatively stable position of the industrials compared with the utilities and even the steam railroads. The industrials showed the smallest increase in risk of any of the groups during the peak year (1920) but fluctuated in

the same general direction as the other groups.

Public utilities are conspicuous during this period for the unusually high degree of inescapable risk involved in their operations. The manufactured gas, combined electric light and power and electric railway, and electric railway groups were affected most severely, and the other public utility services to a less degree.

Commodity prices reached their peak during the inflation period of 1920; wages increased; material costs, especially, rose to exceptional heights. Faced with rapidly increasing operating costs, the utilities could not adjust rates to higher levels to keep pace with inflated prices. Earnings declined, their credit suffered, and they were forced to pay correspondingly higher prices for funds.

The prosperity of industrial concerns was also affected by their inability to increase prices proportionately and simultaneously with rising costs of production. Since the industrials were not analyzed as were the utilities, it is difficult to determine from the data here presented the extent to which increasing costs influenced their credit position. Additional information, such as data on profits, dividends, and amounts set aside to or appropriated from depreciation reserve and surplus accounts, is needed before more than a tentative conclusion can be reached. However, the results of this study suggest that industrial concerns are better able to meet rising costs of production by price increases to consumers of their product than most public utility companies which are limited not only by economic factors but also, at least temporarily, by regulatory restrictions on rate increases; on the other hand, such regulatory adjustments may also tend to lag behind falling production costs. These tendencies are emphasized

by the use of absolute differences in yield (Chart I, Figure 1) instead of ratios of public utility yields to municipal yields (Figure 2).

The electric light and power industry started the period as the most risky and ended among the least risky, while the electric railways began with least risk but closed among the highest. The telephone and telegraph group started low and ended lowest, but increased in risk above the electric light and power industry during the first half of 1920.

1921-1929. After enjoying the greatest freedom from risk since pre-war days in the third quarter of 1921, the steam railroads again began to lose ground and reached the top of their present cycle of comparatively high risk in 1923 and almost duplicated it in 1925. The subsequent improvement has been fairly steady, with a temporary halt in 1928 followed by a sharp renewal in trend toward improvement in 1929.

In 1921 the industrials exhibited the same tendency toward improvement as the steam railroads, but to a less extent. They also increased in risk during 1922-1925, began to improve their condition in the latter half of 1925, lost ground during 1927-1928, but attained the best position in 20 years in the third quarter of 1929.

If the large increased risk shown by the all-utility group average during the period from 1918 to 1925 is removed, it may be said that in the latter year the public utilities renewed the tendency toward improvement which was interrupted by these seven war- and post-war years. While the average of all utilities almost reached the level of the industrials in the third quarter of 1925, they did not drop below until almost two years later.⁸ However, an average of the

three electric light and power groups, not shown on the charts, dropped below the risk level of the industrials in the third quarter of 1924, and these industries have maintained their relatively improved position to date.

The outstanding characteristic of this period for the public utility groups is the definite trend toward improvement from 1922 to the present time, with the notable exception of the electric railway industry since 1925. In the first part of the period (1921-1925) a widening in the range in risk was apparent between the lowest and the highest group of utilities compared with the pre-war period; but, excepting the electric railways, the tendency for this range to narrow has been accentuated considerably in recent years.

The mixed group of electric light and power and electric railways behaved more like the electricity and gas groups than it did like the electric railways, thus suggesting that electric railway service is becoming a less important part of the total business of companies in this group. Almost no shift in the relative position of the gas, electric light and power and gas, and electric light and power groups was noticeable during this period.

The telephone and telegraph industry improved more than the electric light and power group during the latter half of 1921 and most of 1922, but thereafter the two industries maintained a remarkably parallel course until 1928 when the electric light and power group made substantial progress, but was again tied by the telephone and telegraph industry in 1929.

These two industries are rapidly approaching the enviable risk level of the steam railroads, perhaps because the industries are growing older, and more integrated; their services constantly increasing in extent and importance; the

⁸Electric light and power, electric light and power and gas, and gas. See Table IV for averages.

TABLE IV. RATIOS OF YIELDS ON PUBLIC UTILITY, INDUSTRIAL, AND STEAM RAILROAD BONDS TO MUNICIPAL BONDS, 1909-1929

PERIOD	Steam Railroads (10)	Industrials (15)*	All Utilities (31)b	Electric Light and Gas (15)	Telephone Telegraph (5)	Electric Light Power (5)	Electricity and Gas (5)	Manu- factured Gas (5)	Electric Light and Power and Electric Railways (6)c	Electric Railways (5)d
The Year 1909.....	102.6	125.6	128.5	130.1	127.7	131.4	133.2	125.9	131.4	120.8
First Quarter.....	102.7	126.8	130.0	131.0	130.2	133.4	134.5	126.5	132.6	122.5
Second Quarter.....	102.8	127.0	130.5	131.5	130.5	133.5	134.8	126.5	132.6	122.5
Third Quarter.....	102.6	124.5	127.9	127.0	127.9	130.3	132.4	126.1	131.1	119.2
Fourth Quarter.....	102.1	123.4	126.2	125.9	124.7	128.6	131.2	124.2	129.6	119.5
The Year 1910.....	100.8	121.7	124.7	125.3	122.9	126.2	130.2	123.4	127.5	117.9
First Quarter.....	102.1	122.1	125.4	127.2	123.7	127.2	131.6	123.4	128.5	118.0
Second Quarter.....	101.3	121.9	123.6	124.8	123.4	125.9	130.2	122.7	127.7	117.9
Third Quarter.....	100.9	121.3	123.0	124.8	123.4	125.9	130.2	122.7	127.7	117.9
Fourth Quarter.....	100.5	121.4	124.6	125.3	122.1	126.1	129.6	123.9	127.6	117.6
The Year 1911.....	101.6	120.7	122.7	124.7	121.5	124.5	128.3	121.5	126.3	116.7
First Quarter.....	102.0	120.5	124.6	126.3	123.3	126.3	130.4	122.5	127.8	117.2
Second Quarter.....	101.8	120.5	123.3	124.6	121.5	124.6	128.1	121.3	126.8	116.7
Third Quarter.....	101.5	120.4	120.6	123.8	120.9	123.6	127.1	120.4	124.6	116.6
Fourth Quarter.....	102.5	121.7	122.4	124.0	120.9	125.4	127.3	121.2	123.4	116.6
The Year 1912.....	102.8	120.6	121.6	122.6	119.8	122.1	125.8	120.1	125.1	115.8
First Quarter.....	102.5	121.5	122.0	122.3	119.4	123.7	126.3	120.7	125.5	115.9
Second Quarter.....	102.5	120.9	121.4	122.7	119.6	122.4	125.2	120.2	125.2	115.9
Third Quarter.....	103.5	119.8	121.6	122.6	120.1	121.6	126.1	119.8	125.1	116.0
Fourth Quarter.....	102.2	119.7	120.4	121.7	120.6	120.0	124.9	118.7	123.6	114.8
The Year 1913.....	102.2	119.6	119.6	119.9	120.3	117.9	123.7	118.2	122.2	114.4
First Quarter.....	102.5	119.7	120.4	120.9	120.4	119.4	124.8	118.2	123.6	115.0
Second Quarter.....	102.1	118.5	118.3	118.8	119.5	117.6	122.1	116.4	120.9	113.8
Third Quarter.....	100.0	117.0	117.5	117.9	117.7	115.6	121.9	116.6	119.8	112.6
Fourth Quarter.....	103.6	121.3	121.6	121.8	123.3	119.2	125.4	120.9	124.2	116.1
The Year 1914.....	104.7	122.0	123.0	123.3	124.5	120.5	127.2	121.8	126.7	117.1
First Quarter.....	104.7	121.5	123.2	123.7	124.7	120.7	127.2	122.0	126.4	117.0
Second Quarter.....	104.5	121.5	122.8	123.3	124.0	120.0	128.2	121.3	126.7	116.8
Third Quarter.....	104.5	121.5	122.8	123.3	124.0	120.0	128.2	121.3	126.7	116.8
Fourth Quarter.....	104.5	121.5	122.8	123.3	124.0	120.0	128.2	121.3	126.7	116.8
The Year 1915.....	105.8	120.9	123.1	122.9	122.9	121.2	126.5	120.9	127.5	119.0
First Quarter.....	105.8	122.1	123.8	124.6	124.6	121.6	128.2	121.7	127.0	117.5
Second Quarter.....	104.3	120.7	122.4	122.4	122.4	122.4	125.5	119.5	126.0	117.8
Third Quarter.....	106.5	119.5	122.1	120.9	121.6	118.0	125.0	119.5	126.7	120.4
Fourth Quarter.....	106.2	120.8	123.3	123.0	121.8	120.3	126.5	122.3	129.5	119.8
The Year 1916.....	108.1	124.4	124.4	123.9	122.4	121.6	126.7	123.7	129.8	121.6
First Quarter.....	108.4	124.6	124.6	123.2	122.4	121.6	126.7	123.7	129.8	121.6
Second Quarter.....	108.1	124.1	123.8	123.2	122.3	121.3	126.1	122.8	129.6	121.3
Third Quarter.....	108.1	124.0	123.7	123.2	122.2	121.0	126.0	122.7	128.8	121.0
Fourth Quarter.....	108.2	124.9	124.9	124.9	122.9	122.1	127.2	122.2	129.6	122.4
The Year 1917.....	107.9	122.1	123.3	123.5	122.1	121.8	123.0	125.7	126.6	119.9
First Quarter.....	107.2	125.1	125.1	125.1	125.0	121.5	123.0	124.8	126.9	119.0
Second Quarter.....	107.2	125.1	125.1	125.1	125.0	121.5	123.0	124.8	126.9	119.0
Third Quarter.....	108.0	119.8	122.1	122.1	121.3	119.8	121.6	124.7	125.4	119.8
Fourth Quarter.....	108.6	121.7	122.9	123.5	122.6	123.3	121.0	126.2	124.7	118.6
The Year 1918.....	110.1	122.2	128.6	129.1	126.7	120.9	125.8	130.9	129.8	125.1
First Quarter.....	107.7	120.5	127.4	128.5	126.7	120.9	124.5	131.8	127.6	125.4
Second Quarter.....	109.7	120.5	127.4	128.5	126.7	120.9	124.5	131.8	127.6	125.4
Third Quarter.....	112.9	124.4	132.3	133.0	132.1	134.8	129.6	134.8	133.4	129.8
Fourth Quarter.....	110.1	124.1	129.1	129.8	125.7	130.5	128.0	131.0	133.7	126.4
The Year 1919.....	114.6	125.3	132.2	136.7	130.1	132.6	139.2	135.6	137.2	130.4
First Quarter.....	114.6	125.3	132.2	136.7	130.1	132.6	139.2	135.6	137.2	130.4
Second Quarter.....	112.5	121.4	128.9	128.4	126.4	129.1	126.1	133.5	133.5	128.6
Third Quarter.....	116.2	123.1	133.2	133.2	131.6	134.8	130.2	134.3	138.7	129.3
Fourth Quarter.....	116.2	125.6	139.3	136.8	136.1	138.4	134.7	142.9	145.2	136.1

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The Year 1918.....	110.1	123.4	130.1	137.2	140.4
First Quarter.....	107.7	119.9	124.1	129.1	126.9
Second Quarter.....	109.5	120.5	125.4	129.4	127.6
Third Quarter.....	112.9	124.4	129.3	133.8	125.4
Fourth Quarter.....	110.9	122.4	127.8	131.0	126.4
The Year 1919.....	111.6	123.3	130.1	137.2	140.4
First Quarter.....	111.9	123.4	129.7	134.5	136.9
Second Quarter.....	112.5	124.1	130.6	135.5	138.6
Third Quarter.....	113.1	124.7	131.2	136.1	139.3
Fourth Quarter.....	110.7	123.2	129.8	134.7	137.1
The Year 1920.....	110.7	123.2	130.1	137.2	140.4
First Quarter.....	110.7	123.2	130.1	137.2	140.4
Second Quarter.....	111.4	123.9	130.8	137.9	140.6
Third Quarter.....	113.8	126.6	133.5	140.9	138.1
Fourth Quarter.....	107.1	124.4	131.1	137.0	129.0
The Year 1921.....	105.7	120.6	127.5	134.7	138.5
First Quarter.....	106.0	122.4	129.1	136.3	140.5
Second Quarter.....	106.7	123.1	129.8	137.0	140.5
Third Quarter.....	103.1	118.7	123.6	130.0	134.6
Fourth Quarter.....	107.1	123.3	129.1	134.7	141.6
The Year 1922.....	110.9	125.8	132.2	139.1	140.1
First Quarter.....	110.1	126.0	132.4	139.3	141.2
Second Quarter.....	112.4	127.3	134.9	141.2	143.3
Third Quarter.....	109.3	125.0	132.4	138.0	142.2
Fourth Quarter.....	112.4	125.1	133.5	141.5	136.6
The Year 1923.....	113.4	125.8	131.8	138.5	136.1
First Quarter.....	115.3	128.3	134.2	141.1	139.4
Second Quarter.....	114.8	128.3	134.9	141.2	137.0
Third Quarter.....	111.3	123.7	129.8	135.0	133.8
Fourth Quarter.....	112.4	123.2	129.1	134.1	134.2
The Year 1924.....	113.3	126.2	132.1	139.1	138.1
First Quarter.....	113.0	124.3	130.3	137.2	134.4
Second Quarter.....	112.4	126.1	132.1	139.0	135.2
Third Quarter.....	113.2	126.7	132.4	139.4	138.2
Fourth Quarter.....	114.3	126.9	132.4	139.1	133.6
The Year 1925.....	113.6	124.9	132.7	139.1	135.1
First Quarter.....	114.6	126.6	134.1	141.0	137.7
Second Quarter.....	114.5	127.0	134.1	141.0	136.8
Third Quarter.....	113.5	124.9	132.7	139.0	135.2
Fourth Quarter.....	111.1	121.0	127.7	132.9	128.3
The Year 1926.....	109.6	120.3	125.9	129.8	133.6
First Quarter.....	109.2	120.5	126.1	130.1	133.6
Second Quarter.....	108.6	120.8	126.4	130.4	133.5
Third Quarter.....	110.1	120.6	126.1	130.1	133.4
Fourth Quarter.....	108.6	119.3	125.5	129.1	133.3
The Year 1927.....	107.3	122.3	127.1	132.1	133.4
First Quarter.....	108.5	120.6	127.7	132.1	133.4
Second Quarter.....	107.9	121.2	128.1	132.1	133.3
Third Quarter.....	107.1	120.5	127.4	131.7	132.8
Fourth Quarter.....	106.2	123.1	128.8	132.6	133.4
The Year 1928.....	108.3	122.0	128.1	132.6	133.4
First Quarter.....	109.4	124.5	130.4	134.7	135.3
Second Quarter.....	108.6	123.3	129.3	133.8	134.2
Third Quarter.....	107.3	121.4	127.4	131.9	130.1
Fourth Quarter.....	107.3	120.7	126.6	131.4	129.0
The Year 1929.....	106.8	118.2	125.1	130.3	133.6
First Quarter.....	108.9	119.9	126.6	131.9	135.1
Second Quarter.....	107.5	118.2	125.1	130.3	132.6
Third Quarter.....	106.2	116.4	123.2	128.3	131.4
Fourth Quarter.....	104.9	117.9	121.2	126.6	129.4

aSource: Standard Trade and Securities Service, *Biennial Statistical Bulletin*, 1929, p. 14, and subsequent monthly supplements. Figures used as published without analysis or change.
 bPercentage difference between average of 6 utility group averages and average of lowest 10 of a group of 11 municipal bond yields used as the base.
 cPercentage difference between average of middle 6 of a group of 10 bond yields and the municipal group average yield used as the base.
 dPercentage difference between average of middle 5 of a group of 7 bond yields and the municipal group average yield used as the base.

companies becoming larger and stronger financially; or prospects for the future appearing brighter. Whatever the causes, their bonds are increasing in favor with investors.

Business Cycle Influences

The period from 1921 to 1929 should offer some evidence of the influence of cyclical variation in general business conditions on the credit position of the groups studied. The industrials would ordinarily be expected to show greater sensitivity to cyclical variations in general business than the steam railroads or other public utility industries.

If a smooth trend line from 1921 to 1929 is drawn through the curve representing the industrials, the variations in their credit position will be observed to coincide, though lagging somewhat, with fluctuations in general business activity; to be more precise, risk as reflected in the highest grade industrial bond issues was greatest during the depression of 1921, somewhat less during that of 1924, and still less during the dip of 1927. The upswings of the business cycle in 1923-1924, 1925-1926, and 1929 are reflected in the decline in amount of industrial risk.

If trend lines are now fitted to the curves representing all utilities, and even

the strongest companies in the electric light and power and telephone and telegraph industries, it will be seen that these preferred industries also follow the up-and-down swings of the business cycle apparent in the industrials and in general business.

Summary

The long-term credit position of the public utility industries, with the exception of the electric railways and the steam railroads, has improved somewhat over the past 20 years. This is the outstanding tendency for which a quantitative measurement is here offered. At the same time the analysis leaves the definite impression that short-time influences also have a noticeable effect upon the credit position of these industries. The causal interpretation of these tendencies for utilities as a group and for separate utility groups compared with one another is left to the reader. Whether regulation aids or hampers these industries in minimizing credit risks at different stages in the business cycle is a question involving many complications. One can only suggest that the above data reveal the strength of economic forces.

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JOINT OPERATION OF MUNICIPAL UTILITIES IN WISCONSIN*

By E. ORTH MALOTT

The previous installment of this article, after setting forth the facts as to the extent of joint operation of municipally owned utilities in Wisconsin and their distribution according to type of station and population group, followed the same classification in the analysis of plant and property value among the various joint utilities concerned. These latter data are summarized in Table V. It remains,

TABLE V. PERCENTAGE DISTRIBUTION OF PLANT AND PROPERTY VALUE BY TYPE OF STATION AND POPULATION GROUPS FOR SELECTED YEARS.

	1911	1916	1919	1922	1926
TOTAL: All Types	100.0	100.0	100.0	100.0	100.0
Steam.....	71.4	50.5	38.2	22.7	11.1
Hydro.....	11.7	14.6	15.2	13.4	14.4
Gas and Oil.....	7.8	12.6	11.4	6.2	1.1
Purchasing.....	9.1	22.3	35.2	57.7	73.4
TOTAL: All Groups	100.0	100.0	100.0	100.0	100.0
Under 500.....	5.2	8.7	11.4	11.3	7.8
501-1000.....	37.6	39.8	37.2	28.9	28.8
1001-1500.....	16.9	17.5	18.1	16.5	16.7
1501-2000.....	15.6	12.6	12.4	15.5	16.7
2001-3000.....	10.4	7.8	7.6	8.2	8.9
Over 3000.....	14.3	13.6	13.3	19.6	21.1

therefore, to consider the joint operating revenues and their distribution among the separate types of utilities represented.

Joint Utility Operating Revenues

Table VI gives the percentage distribution of all operating revenues of each type of plant among the electric, water and other utilities in the group of that type of plant. The striking point in the table is the relatively small proportion of total operating revenues of each type

of station which is derived from the water utility. Taken alone this point might not be so important because many variables may cause the disproportion. But, when related to the percentage of joint operation (Table I) and the distribution of plant and property values (Table III), the distribution of revenues becomes more significant.

With about 70% of the municipal plants having jointly operated water utilities in the earlier years of the period studied, the water utility was credited with nearly half of the total plant and property value. Yet operating revenues from the water service in 1911 were only 28.6% of the total operating revenues and the electric service supplied 70.5%. Again in 1926, 86.2% of the municipal electric plants also rendered water service and the percentage of total property and plant had fallen to 46.7% for water, while the electric utility had 50.9%.¹² Yet the total operating revenues are secured 78.8% from electric service and only 18.2% from water service. Stating the situation in other words, the *average* capital turnover of the water utilities is considerably less than that of the electric utilities and became less between the earlier period and 1926. This statement is made without regard for the possibility that the water utility may be subsidized by the joint electric utility. The validity of such an assumption will be discussed presently.

Analysis of joint utility operating revenues by population groups shows

*See 6 *Journal of Land & Public Utility Economics* 196-203 (May, 1930). Table and footnote numbers follow consecutively in the current article.

¹² The remainder of 2.4% of total property value is represented by common and "other" joint utility property.

only a small portion (4.3% in 1926) of the revenues of the smallest population group to be derived from the water

TABLE VI. PERCENTAGE DISTRIBUTION OF TOTAL JOINT UTILITY OPERATING REVENUES BY KIND OF UTILITY SERVICE FOR TYPE OF STATION FOR SELECTED YEARS

Type of Station and Year	Percentage Distribution of Total Joint Utility Operating Revenues			
	From Electric Service	From Water Service	From Other Utility Service	Total Revenues
All Types				
1911	70.5	28.6	.9	100.0
1916	75.0	23.5	1.5	100.0
1919	74.0	24.0	2.0	100.0
1922	78.0	18.7	3.3	100.0
1926	78.8	18.2	3.0	100.0
Steam				
1911	71.8	27.1	1.1	100.0
1916	73.0	24.8	2.2	100.0
1919	71.9	24.4	3.7	100.0
1922	76.2	22.0	1.8	100.0
1926	74.7	22.7	2.6	100.0
Hydro				
1911	67.1	32.9	....	100.0
1916	72.7	27.3	....	100.0
1919	76.9	23.1	....	100.0
1922	91.1	8.9	....	100.0
1926	91.3	8.7	....	100.0
Gas and Oil				
1911	34.6	65.4	....	100.0
1916	89.1	10.9	....	100.0
1919	79.0	21.0	....	100.0
1922	74.9	25.1	....	100.0
1926	72.8	27.2	....	100.0
Purchasing				
1911	72.0	28.0	....	100.0
1916	84.2	15.8	....	100.0
1919	75.7	24.3	....	100.0
1922	75.5	18.8	5.7	100.0
1926	77.0	18.7	4.3	100.0

utility (Table VII). This confirms the analysis of the plant and property account (Table IV). The 500 to 1,000 population group has a larger relative amount (14.2% in 1926) of revenues derived from the water utility service but still less than that of the four larger groups. The water revenues of the larger groups range between 18.2% to 19.3% of total operating revenues. In all population groups the proportion of total operating revenues derived from the electric service has shown a tendency to increase over a period of years, while the proportion obtained from the water service has shown a corresponding tendency to decrease. One probable explanation is the greater development of

electric load which is more susceptible of expansion than the water load.

Table VIII presents the ratio of operating revenues to the corresponding plant and property account. In 1926 the ratio of all operating revenues derived from all water utilities was 11% of the total value of the property allocated to the water utility. Neglecting assets other than plant and property the capital turnover of the water utilities as a group was accomplished once every nine years.

TABLE VII. PERCENTAGE DISTRIBUTION OF TOTAL JOINT UTILITY OPERATING REVENUES BY KIND OF UTILITY SERVICE FOR POPULATION GROUPS FOR SELECTED YEARS

Population Group and Year	Percentage Distribution of Total Joint Utility Operating Revenues			
	From Electric Service	From Water Service	From Other Utility Service	Total Revenues
Under 500				
1911	72.6	27.3	....	100.0
1916	90.0	9.1	....	100.0
1919	96.5	3.5	....	100.0
1922	90.5	9.5	....	100.0
1926	95.7	4.3	....	100.0
500-1000				
1911	79.1	16.8	4.1	100.0
1916	80.2	18.8	1.0	100.0
1919	85.0	15.0	....	100.0
1922	86.1	13.9	....	100.0
1926	85.8	14.2	....	100.0
1001-1500				
1911	67.2	32.8	....	100.0
1916	75.2	24.8	....	100.0
1919	76.2	23.8	....	100.0
1922	79.7	18.7	1.6	100.0
1926	80.0	18.2	1.8	100.0
1501-2000				
1911	73.0	27.0	....	100.0
1916	79.0	21.0	....	100.0
1919	78.5	21.5	....	100.0
1922	80.7	19.3	....	100.0
1926	81.8	18.2	....	100.0
2001-3000				
1911	72.7	27.3	....	100.0
1916	73.6	26.4	....	100.0
1919	71.7	28.3	3.0	100.0
1922	80.3	19.7	....	100.0
1926	80.9	19.1	....	100.0
Over 3000				
1911	66.2	32.9	.9	100.0
1916	72.1	24.7	3.2	100.0
1919	69.6	27.1	3.3	100.0
1922	75.1	19.4	5.5	100.0
1926	75.8	19.3	4.9	100.0

A similar ratio for the whole group of electric utilities gave 43.2% and, again neglecting other assets, the capital turnover would be completed about once every $2\frac{1}{3}$ years. For the combined utilities, the ratio of revenues to property

was 28% with a capital turnover every three years and seven months, the water revenues pulling down the average for the combined utilities. The "other utilities" have a ratio of operating revenues to plant account of 37.9% but this group is mixed and not subject to analysis.

TABLE VIII. RATIO OF OPERATING REVENUES TO CORRESPONDING PLANT AND PROPERTY ACCOUNT BY TYPE OF STATION FOR SELECTED YEARS

Type of Station and Year	Percentage Ratio of Operating Revenues to Plant Account: Kind of Utility			
	Electric	Water	Other Utility	Total
All Types				
1911	33.3	13.7	*	23.8
1916	35.9	11.7	236.6	24.3
1919	34.6	13.0	112.7	25.0
1922	41.7	12.0	45.3	28.6
1926	43.2	11.0	37.9	28.0
Steam				
1911	34.5	13.5	*	24.5
1916	39.6	12.4	236.6	25.9
1919	35.8	12.6	112.7	25.1
1922	41.1	12.8	122.4	27.8
1926	36.9	12.7	34.9	25.5
Hydro				
1911	24.7	12.0	....	18.3
1916	22.9	11.1	....	17.7
1919	24.8	16.5	....	22.2
1922	31.3	8.2	....	25.0
1926	35.7	9.6	....	28.9
Gas and Oil				
1911	*	*	....	*
1916	36.9	10.5	....	28.9
1919	29.5	11.7	....	22.3
1922	24.9	15.6	....	21.4
1926	21.9	11.9	....	17.2
Purchasing				
1911	38.7	11.1	....	22.8
1916	41.5	8.5	....	25.7
1919	45.3	12.6	....	27.7
1922	49.7	11.9	39.6	30.9
1926	52.1	10.4	38.8	29.5

*Incomplete reports.

Steam and hydro plants each have a ratio of operating revenues to property account of about 36% for the electric utility in 1926. But for the water utility the steam plant group has a ratio of 12.7% and the hydro plant group a ratio of only 9.6%.

The oil plant had 21.9% as a ratio of revenues to property for the electric utility. The low ratio is partially be-

cause the rates are low and probably also because the power load has not been cultivated. For this plant the water utility had a "turnover" of 11.9%.

Purchasing plants show a high ratio of operating revenues to property and the ratio has continually increased from 38.7% in 1911 to 52.1% in 1926. The reason for the high ratio is the comparatively small plant and property investment necessary. The water utilities jointly operated by purchasing plants had a ratio of 10.4% in 1926 which is somewhat below the average of all water utilities.

The fact that the turnover of the joint water utility is so low in each case as compared with the turnover of the joint electric utility supports but does not conclusively prove, of course, that the water plants are financially aided by their connection with the electric plants.

Summary of Joint Utility Operating Revenues

No special study was made of the water utility operating expenses but numerous examinations of joint water utility income accounts seem to indicate that the water utility is frequently operated practically at cost.¹³ Since the water revenues are so low the doubt arises as to whether they are really sufficient to cover all costs of operation or whether the sufficiency is a result of shifting a portion of the costs to the joint electric utility through the faulty allocation of joint-cost expenses. The use of the electric utility steam power, or electric power, for pumping water has in the past not always been paid for even through bookkeeping entries. The Commission usually insisted upon some

¹³ By costs is meant "book cost." The municipality seems concerned only in making water revenues balance book costs. These book costs vary and may include depreciation, interest and taxes but probably would not

include the return on equity. An attempt would be made to cover whatever is decided as a book cost of the water utility. Where, for example, bonds have been issued as "water and light bonds" without a separation of the principal, the interest may or may not be shared.

payment whenever such a situation was noticed. The earnings of one electric utility were even being used to finance the water utility.¹⁴ Deficits have occasionally been incurred by the water utility to the disadvantage of the joint plant surplus.

Capital turnover is naturally affected by the rate level, as shown by the oil plant in 1926. Then, too, the other assets, when added to the plant and property account, would tend to reduce the ratio of operating revenues to assets. Since assets other than plant and property are so small compared to the property account, the decrease of the computed turnover would be small. But allowing for both of these qualifications, the ratios of operating revenues to property account (Table VIII) show a good position for the municipal electric plants which are, after all, only *small* plants and not comparable with large plants. The municipal water plants seem, however, not to be in as good a position as the electric plants and may even be subsidized to a greater or lesser degree by the joint electric utility.

From the results disclosed by this study, the joint operating of municipal electric and water utilities appears to have been financially more beneficial to the water utility than to the electric utility. That is, the water utility has often been subsidized to a greater or less degree and in various ways by the com-

panion electric utility. The starting point for further research is suggested by the questions which arise in this connection. To what extent is municipal ownership of the water utility accompanied by some form of subsidy?¹⁵ Would water utilities under private ownership of necessity require higher rates than under public ownership with its possibility of subsidy? One is also curious about the effect upon rate schedules of the sale to private interests of municipal electric plants which were jointly operated with water plants.

So much energy has been devoted to studies of municipal electric utilities that the often accompanying municipal water utility seems to have been overlooked. Yet undoubtedly the presence of the joint water utility has had a definite influence upon the electric utility, perhaps causing a general increase of electric utility costs. The neglect of the study of municipal ownership and operation of water utilities is frequently excused by the statement that social necessity, and not economic factors, has been the controlling force in the development and operation of the water utility. Yet, in view of the situation indicated in Wisconsin and in view of the movement of some classes of municipal water plants toward private ownership, a further study of this complex problem would be desirable.

¹⁴ The Common Council of Manitowoc resolved on April 28, 1923, "that the local utilities Commission be and it is hereby directed and authorized to pay into the general fund of the city of Manitowoc \$25,000.00 of its unappropriated available cash profits as a return on the city's investment in the municipal light and water plant." Although only 58% of the city's investment was in the electric plant, the \$25,000.00 was appropriated wholly from the electric income as was also an appropriation of \$25,000.00 in 1922 and of \$66,793.65 in 1921. The explanation given to the Railroad Commission of Wisconsin for the inequality was that "up to a year ago there was very little available for an appropriation of this nature in the water department. We

are now trying to conserve our cash resources of said department to re-invest in plant extensions and probably for a new lake intake, as we have not used tax appropriations to pay for improvements, all of which have been paid out of the earnings of the plants since their acquisition." (77 Manitowoc 1924.) The reader is referred for other instances of the failure equitably to apportion operating expenses to Chapter 6 of the writer's monograph, *supra* n. 8.

¹⁵ On the other hand, it may be said that the municipal hydro-electric system of Los Angeles is subsidized by the municipal water department. Part of the hydro-electric production is incidental to securing a water supply.

DEPARTMENTS

The departments of the JOURNAL are edited specifically with regard to their interest to the readers who are especially concerned with the economic problems of land and public utilities. For the most part the material for the departments will be prepared by members of the staff of the Institute for Research in Land Economics and Public Utilities.

SUMMARIES OF RESEARCH

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SUMMARIES OF RESEARCH

PUBLIC UTILITY FINANCING, THROUGH MAY, 1930

IN recent months business and financial conditions have been generally unsettled and dreary; timidity has been the prevailing attitude. This state of mind one expects to find registered sharply in the financial markets, which began the new year with vivid impressions of last autumn's difficulties, and especially in utility financing, since utilities are increasingly regarded as mirrors of business conditions. But, actually, utility financing has not altogether borne out these expectations.

A few of the significant characteristics of recent public utility activity in the capital markets may be summarized:

1. There has been a pronounced recovery in the amount of public utility financing during 1930.
2. Utility financing has comprised a larger portion of the total corporate financing to date this year than in any previous calendar year.
3. Stocks increased in favor as instruments of finance; most of the stock financing was done through stock rights and sales to stockholders.
4. The price of public utility debt capital evidences a downward tendency, with holding companies

TABLE I. INDEX NUMBER OF VOLUME OF PUBLIC UTILITY FINANCING, 1919-1930*

	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930
By Months												
January.....	100	67	55	46	122	112	199	173	259	176	169	412
February.....	48	28	25	47	66	89	172	125	314	220	248	144
March.....	25	27	25	43	94	78	144	115	158	190	268	191
April.....	5	38	25	50	64	112	69	182	165	318	107	110
May.....	15	38	35	150	66	233	103	230	214	203	287	506
June.....	26	20	9	96	92	122	118	181	130	317	109	...
July.....	41	25	115	44	21	104	90	177	97	48	276	...
August.....	20	11	33	22	40	62	93	58	92	82	94	...
September.....	54	44	34	147	34	77	110	38	168	169	319	...
October.....	24	33	33	77	59	112	92	123	261	180	86	...
November.....	8	21	119	43	161	69	102	136	212	127	22	...
December.....	20	63	53	54	135	111	153	114	433	167	126	...
By Quarters												
1st quarter.....	100	71	61	80	164	162	299	240	424	340	398	297
2nd quarter.....	27	56	41	172	129	271	168	344	295	487	292	...
3rd quarter.....	67	47	105	123	55	141	170	159	207	178	400	...
4th quarter.....	30	68	119	101	206	169	201	217	528	275	99	...
By Years.....	100	107	145	212	246	330	373	427	647	570	528	...

* Volume for January, 1919; first quarter, 1919; and year 1919 used as a basis for computing index numbers for months, quarters, and years respectively. Compiled from the monthly record of new capital flotations of the *Commercial and Financial Chronicle*.

In connection with these volume figures of public utility financing it should be noted, that:

1. All industrial types of utilities (except steam railroads) are included.
2. Foreign companies offering securities in the United States are included.
3. The volume figures through 1929 are the *Chronicle* figures before the revision made in January, 1930. Beginning this year the *Chronicle* separates "Investment Trust, Trading and Holding Companies (not Primarily Controlling)." Prior to this time such issues had been included partly in the "Public Utility" total and partly in the "Miscellaneous" group. The *Chronicle*, at the same time, revised its totals of public utility financing for the corresponding month of the five preceding years. We have here used the unrevised figures prior to 1930.

It might be suggested that the volume figures for 1930 are not comparable with those of the preceding years. One practical difficulty precludes the possibility of revising the total before 1929 to agree with 1930. That difficulty is the fact that the *Chronicle* figures for the previous five years only are revised, and this revision is made monthly. The only comparison which could be attempted at present would be to make the January and February totals for 1926 through 1930 comparable, but they would then not be comparable with other months in the same years, nor with earlier years.

In the analysis of these utility financing figures the foreign issues have been eliminated. What appear to be non-controlling investment companies have also been excluded; holding and operating company issues have been segregated (Table V).

improving their position more rapidly than operating companies.

Volume of New Issues. The first five months of 1930 witnessed a great increase in public utility financing, in marked contrast to the lethargic condition which followed the market crash of last October (Table I). Utility issues totaled \$279,640,000 during the last quarter of 1929, making a monthly average of \$93,210,000. From January through May, 1930, utility securities to the amount of \$1,628,188,761 were issued. The average per month so far for 1930 is therefore \$325,638,000, almost $3\frac{1}{2}$ times the monthly average for the last quarter of 1929.

Several new records for the volume of public utility financing have been recently established. Last year, for example, more financing was done during the first nine months than in the corresponding period in any other year.¹ Now, in 1930, two new volume records have been set up: (1) a new record for the volume of securities issued during the first five months of any year; and (2) a new monthly record of financing. In May \$604,500,000 of utility securities were put on the market. This surpasses the previous high month, December, 1927 (\$517,412,000) by \$87,100,000. Table II indicates that the monthly average for the first five months of 1930 is significantly above the corresponding figure for any previous year.

This increased volume of financing is not *prima facie* evidence that most public utility companies are finding it desirable to raise capital at this time. A few large issues may swell the total volume of financing without any generally increased activity on the part of most companies. For example, elimination of

the \$235,000,000 American Telephone and Telegraph stock issue and the \$120,000,000 Cities Service debenture issue reduces the May total of utility financing from \$604,500,000 to \$249,500,000. In order to get a volume figure more representative of general financing activity in the industry, such exceptionally large issues should be eliminated. The volume index numbers thus corrected are shown in Column B of Table II.

TABLE II. AVERAGE MONTHLY INDEX NUMBER OF VOLUME OF PUBLIC UTILITY FINANCING: JANUARY—MAY (JANUARY, 1919=100)

Year	All Issues (A)	Issues Over \$50,000,000 Eliminated (B)
1919.....	39	39
1920.....	40	40
1921.....	33	33
1922.....	67	67
1923.....	82	82
1924.....	125	117
1925.....	137	108
1926.....	165	128
1927.....	222	185
1928.....	221	197
1929.....	216	150
1930.....	273	188

Utility and Corporate Financing. In general the utilities have recovered in financing activity more rapidly than have other industries. As a result, public utility financing is more significant in the total of corporate financing for the present period than for any year to date, as shown by the following figures:

1919.....	16.87%
1920.....	16.75
1921.....	28.07
1922.....	31.90
1923.....	35.21
1924.....	39.85
1925.....	36.41
1926.....	37.26
1927.....	40.90
1928.....	33.97
1929.....	24.34
1930.....	
1st quarter.....	48.40
1st 5 months.....	47.17

¹"Utilities in Recent Financial Markets", 6 *Journal of Land & Public Utility Economics* 18-25 (February, 1930).

Almost $\frac{1}{2}$ of the corporate financing done during the first five months of 1930 was done by utility companies. Public utilities were relatively more important in the corporate financial markets in 1927 than in any other year of financing. During 1928 and 1929 they declined noticeably from their high position of the preceding year. The figures to date for 1930 suggest the possibility of a reversal of this tendency.

Type of Issue. Stock financing for the first few months of 1930 was of comparative insignificance. There was, however, a noticeable increase in importance during the period. In January of this year somewhat over $\frac{1}{2}$ of the financing took the form of stock; in May over $\frac{1}{2}$ consisted of stock issues (Table III).

TABLE III. PERCENTAGE OF STOCK, LONG-TERM DEBT, AND SHORT-TERM DEBT IN PUBLIC UTILITY FINANCING,* 1919-1930.

Period	Stock	Debt	Long-Term Debt	Short-Term Debt
1919.....	7.8%	92.2%	37.6%	54.6%
1920.....	12.1	87.9	43.9	44.0
1921.....	18.7	81.3	70.5	10.8
1922.....	30.8	69.2	64.5	4.7
1923.....	23.0	77.0	71.3	5.7
1924.....	34.1	65.9	57.5	8.4
1925.....	31.8	68.2	59.5	8.7
1926.....	24.7	75.3	69.9	5.4
1927.....	28.5	71.5	66.8	4.7
1928.....	37.2	62.8	57.7	5.1
1929.....	58.7	41.3	37.6	3.7
1st quarter.....	58.1	41.9	40.4	1.5
2nd quarter.....	40.6	59.4	52.7	6.7
3rd quarter.....	78.6	21.4	18.1	3.3
1st 3 quarters.....	60.9	39.1	35.5	3.6
4th quarter.....	34.2	65.8	60.8	5.0
1930.....				
January.....	17.8	82.2	72.6	9.6
February.....	26.5	73.5	68.6	4.9
March.....	36.4	63.6	59.2	4.4
1st quarter.....	24.2	75.8	68.4	7.4
April.....	33.9	66.1	61.5	4.6
May.....	54.2	45.8	45.3	0.5
1st 5 months.....	36.1	63.9	59.3	4.6

*Computed from summary of government and corporate financing, *Commercial and Financial Chronicle*.

This increase in the proportion of stock issues is still further emphasized, if it be noted that about $\frac{1}{4}$ of the first three months' financing was by means of stock, while over $\frac{1}{3}$ of the five months' total took this form. At that, stock issues are not nearly as important as they were last year, when over 60% of

the financing for the first three quarters was done by stock issues.

Type of Market. It may be of interest to note in passing a single characteristic of this stock financing, namely, the type of market in which the securities were sold. Was the stock distributed by bankers in the general investment market, or was an attempt made to dispose of the securities to stockholders by granting rights to subscribe at a figure below the market price? Table IV presents the percentage of the number and the percentage of the volume of stock issues disposed of through stock rights.

TABLE IV. STOCK ISSUES DISPOSED OF THROUGH STOCK RIGHTS.

Period	Percentage of Number of Stock Issues	Percentage of Volume of Stock Issues
1929	38.0	72.4
1st quarter.....	32.0	61.8
2nd quarter.....	33.3	52.5
3rd quarter.....	45.2	86.0
1st 3 quarters.....	36.7	71.6
4th quarter.....	45.5	80.4
1930		
1st quarter.....	38.9	78.9
1st 5 months.....	45.0	82.2

*A comparison of these tendencies before and after the market difficulty of last October shows that during the pre-crash period (first nine months of 1929) 36.7% of the number of stock issues and 71.6% of the volume of stock financing used stock rights. Post-crash figures are shown above, beginning with the 4th quarter, 1929.

These percentages seem to indicate:

1. That larger issues primarily are sold by means of stock rights (shown by the excess of the volume over the number percentages). In other words, more financing is done by sales to stockholders than the number of issues thus sold would indicate. Generalization as to the size of stock issues in relation to the tendency to use stock rights is rendered difficult because of the presence of very large issues. With the inclusion of the \$235,000,000 telephone issue, 82.2% of the stock financing done in the first five

months of 1930 was by means of sales to stockholders. Only 68.5% of the remainder of the financing, excluding this one issue, was done in this way. The excess of the volume figures over the number figures indicates, but does not explain or characterize in detail, a tendency in financing.

2. That the general tendency during the last year and a half has been to do most stock financing through stockholders' rights. This tendency appears to be somewhat more noticeable in 1930 than last year. However, the change is so small and the volume figures qualified so much by large issues that a general statement is impossible. A more accurate characterization of the movement and the development of principles guiding the policy of stock financing depends upon a more extensive analysis over a longer period and a more elaborate and detailed survey of particular instances of financing.

Price of Debt Capital. There is apparent a general downward drift in the price of public utility debt capital (Table V). Thus, the average price per dollar of debt financing during the first five months of 1930 (5.34%) is slightly lower than that for 1929 (5.35%), while the average price per issue (5.66% for 1930 to date) is noticeably below last year's figure (5.95%). There is also a general decline from the earlier to the later months of the current year. The yield per issue, for example, has declined from 5.83% in February to 5.51% in May. Without explaining the complicated causal factors, one may note in passing that, with the decline of the

TABLE V. WEIGHTED AND SIMPLE AVERAGE YIELD AT OFFERING PRICE OF NEW ISSUES OF DEBT OBLIGATIONS OF PUBLIC UTILITIES, BY HOLDING AND OPERATING COMPANY GROUPS.*

Year	Weighted Average Yield			Simple Average Yield		
	All Issues	Operating	Holding	All Issues	Operating	Holding
1919.....	6.57	6.53	6.67	6.68	6.63	6.89
1920.....	7.43	7.40	7.63	7.62	7.58	7.95
1921.....	7.14	7.09	8.15	7.50	7.46	8.05
1922.....	6.08	5.99	6.68	6.32	6.26	6.83
1923.....	5.99	5.92	6.58	6.30	6.27	6.56
1924.....	5.97	5.86	6.50	6.13	6.08	6.40
1925.....	5.59	5.48	5.78	5.83	5.77	6.09
1926.....	5.52	5.38	5.90	5.70	5.64	5.90
1927.....	5.22	5.13	5.38	5.58	5.50	5.80
1928.....	5.26	5.09	5.39	5.58	5.41	5.79
1929.....	5.35	5.08	5.75	5.95	5.73	6.25
1st quarter....	5.47	5.50	5.46	5.89	5.83	5.96
2nd quarter....	5.00	4.82	5.99	5.97	5.83	6.19
3rd quarter....	5.86	5.57	6.08	6.20	5.53	6.56
4th quarter....	5.40	5.19	6.53	5.84	5.56	6.45
1930						
January.....	5.30	5.12	5.67	5.53	5.45	5.69
February.....	5.58	5.50	6.44	5.83	5.71	6.44
March.....	5.81	5.64	5.87	5.72	5.55	5.88
1st quarter....	5.42	5.24	5.77	5.70	5.59	5.91
April.....	5.31	5.26	6.45	5.74	5.69	6.45
May.....	5.19	5.21	5.18	5.51	5.44	5.66
1st 5 months	5.34	5.24	5.47	5.66	5.58	5.87

*Computed for issues shown in monthly record of new financing in *Commercial and Financial Chronicle*. Because of the additional information desired for this study, some issues included in previous surveys had to be omitted here because of insufficient information.

price of debt capital, this type of financing, as a proportion of the total volume, has likewise declined.

Recently holding companies have improved their position with regard to the raising of debt capital more rapidly than have the operating companies, if the average yield per-issue be taken as an indicator. During the third quarter of last year holding companies paid on the average 1.03% more than did operating companies (using the per-issue average yield on debt financing).² This differential was reduced to .89% for the fourth quarter of that year; the yearly differential in favor of operating companies was .52%. The improvement continued in the current year with the differential reduced to .32% for the first quarter financing, and to .29% for financing done during the first five months.

ROY L. REIERSON.

*The per-dollar average yield is affected noticeably by very large issues. It is often not representative of conditions generally in the financial markets.

COMMENTS ON LEGISLATION AND COURT DECISIONS

THE CASE OF SMITH v. NEW ENGLAND AIRCRAFT COMPANY¹

THE case of *Harry Worcester Smith v. New England Aircraft Company, et al.*, recently decided by the Supreme Court of Massachusetts with opinion by Mr. Chief Justice Rugg, is an opinion of international importance; let us say rather, it might have been. In it four questions were submitted to a court of last resort for the first time in the United States, with a chance for a clear answer and decision:

(1) Does a landowner have private ownership in the airspace above his land;

(2) Does an airplane commit trespass, by flight alone, in passing over private property;

(3) May this trespass be enjoined;

(4) May Congress or state legislatures create a right of flight over privately owned property?

Unfortunately for the aviation industry and for the many interested property owners, particularly those adjoining airports, the court, it seems, overlooked the opportunity to give a clear-cut answer to these questions. Unfortunately also for both aviation interests and property owners, flat statements are made in the opinions which are equally disturbing to both. We quote two of these statements:

1. "The act of Congress and the statutes of this Commonwealth, by plain implication, if not by express terms, not only recognize the existence of air navigation, but *authorize* the flying of aircraft over privately owned land." (Italics ours).

2. "The combination of all these factors (the facts of the case) seems to us under

settled principles of law, after making every reasonable legal concession to air navigation as commonly understood and as established under the statutes and regulations here disclosed, *to constitute trespass* to the land of the plaintiffs so far as concerns the take-offs and landings at low altitudes and flights thus made over the land of the plaintiffs at altitudes as low as one hundred feet. Air navigation, important as it is, *cannot rightly levy toll* upon the legal rights of others for its successful prosecution." (Italics ours).

To understand thoroughly this remarkable decision, the facts, the contentions of the respective parties, and a complete analysis of the opinion are essential.

The Facts

The plaintiffs, Mr. and Mrs. Harry Worcester Smith, for many years owned an estate of about 270 acres, known as "Lordvale," located in Grafton. It had been used as a country estate and home since 1893. The improvements consisted of a residence, two smaller houses, a garage, and other structures, such as stables and kennels. Except for lawn, garden and open spaces near the home, substantially the entire tract was covered with dense brush and woods. It was used purely for residence and not for farming.

The airport, consisting of about 92 acres, acquired in 1927, adjoined the plaintiffs' land. At its nearest point, the field was 3,000 feet from the residence. It had been improved with runways, etc., at a cost of approximately \$100,000. The New England Aircraft Company was the lessee of the field, owned by

¹ 170 N. E. 385 (1930).

Worcester Airport, Incorporated. The other defendants were individuals who owned planes located on the field.

The New England Aircraft Company sold planes; stored them and serviced them; operated passenger planes both in interstate and intrastate commerce; and also took passengers up for short sight-seeing flights. The evidence showed that the defendants had made approximately 400 flights during May, June and July of 1928.

The plaintiffs' petition alleged that operation by the defendants of the airplanes constituted a nuisance by reason of the "loud, penetrating, piercing, unpleasant and incessant noise" and by reason of "unnecessarily and unreasonably disturbing plaintiffs in the peaceful and quiet enjoyment of their estate." The petition also stated that the defendants continually flew over the land, estate, and buildings "at such a height and in such a manner as to constitute a trespass." The defendants, by their answer, in effect admitted the flights but denied the nuisance and the trespass.

The case was referred by the trial court to a master, who took voluminous evidence and filed his finding of facts, to which there were no exceptions by either party.

The finding of the master, that the flights of the defendants' planes did not in fact constitute a nuisance, disposed of that feature of the case.

With respect to the trespass, however, the master reported as follows:

"There is no evidence in this case that the defendants or any of them have conducted themselves in an unlawful or unreasonable manner, unless those defendants who have flown airplanes from Whittall Field over the plaintiffs' premises in the manner which I have described herein, have, by so doing, committed acts of trespass . . . Whether a flight of an air-plane through the air column surmounting the domains of a landowner is

an act of trespass would appear to be a question of law. Its determination I reserve for the courts."

Both the plaintiffs and the defendants moved for a confirmation of the master's report, the plaintiffs asking that the court enter a decree enjoining the trespass, and the defendants asking that the court enter a decree dismissing the bill. The trial court confirmed the report and dismissed the bill. Therefore, the appeal to the Supreme Court submitted to that court only the question of trespass.

The Contentions

With respect to this question of trespass, the plaintiffs did not contend for an unlimited application of the doctrine of *cuius est solum, eius est usque ad coelum et ad infernos*, but contended solely that under the evidence appearing in the case, i. e., that flights from an altitude of 100 feet to 1,000 feet had actually taken place, that trespass had been committed. The plaintiffs based their contention on the grounds that such structures as the Eiffel Tower of 1,000 feet and many other structures of from 600 to 800 feet had demonstrated that the air was usable at least to that height; that the plaintiffs' ownership of the airspace was at least co-extensive with the usable height. The plaintiffs' position is well shown by this extract from the brief:

1. "The Air Space Which is Now Used or May in the Future Be Used in the Development of the Underlying Land is the Private Property of the Landowner, in which he is entitled to the exclusive use and control.

"There is no question but that a landowner has certain exclusive rights in the air above the surface of his land to a certain height. He may walk upright; he may build to any heights that he can attain; he may erect buildings, poles, masts, etc., to any heights he can. Except for zoning regulations no one can prevent him from doing so, and no one else can make a use of that space. That *air space* is as much a part of the

private property of the owner as the land itself. It is not confined to the present use of the land, but extends to that height to which it is physically possible for the landowner to *maintain effective control*. This air space has always been a property right appurtenant to all real estate. It includes or should include, the air space to a height not only at present usable by the landowner, measured by the heights of various structures in the world today, but also to that height which science and the progress of civilization may make usable to the landowner in the future.

"The situation of the land should make no difference in the heights to which the usable air space extends. That is, the air space is usable to the country owner as well as to the landowner in the heart of Manhattan; and it is not for the Court to speculate as to whether the landowner may or may not make use of that air space so long as he has the right to do so. Science may make available the upper regions of the air to the country owner as well as to the city owner.

"This right to usable air space is a vested right. It has been recognized in the past by the old Latin maxim of *cuius est solum eius est usque ad coelum*. It is not, however, the purpose of the plaintiffs in the present case to base their contention upon this maxim. The plaintiffs' argument is based solely upon the facts found in this case by the master, i. e., continuous flights of the defendants between the heights of 100 and 1,000 feet."

It will be seen, therefore, that the plaintiff abandoned the doctrine of the maxim in so far as it is limitless in application.

On the other hand, the defendants contended that the Latin maxim was not law; that its application in the decided cases was limited to structures and things attached to the ground; and had never been applied or intended to be applied to such heights as were involved in this case. Their position with respect to this might well be illustrated by quotation from their brief, appearing after citation of many cases with relation to the *usque ad coelum* doctrine.

"There are no decisions to the effect that it is a wrong against a landowner to inter-

fere with the space above his land at such a height that the use of the surface is not affected in the slightest degree."

The defendants also contended that, even though the plaintiffs might have a measure of private ownership in the air column above their land, this private ownership was subject to the same possibilities of limitation of use as is the private ownership of land. This contention is well illustrated by quotation from a case, cited by defendants, as follows:

"We think it is a settled principle, growing out of the nature of well ordered civil society, that every holder of property, however absolute and unqualified may be his title, holds it under the implied liability that his *use of it may be so regulated* that it shall not be injurious to the equal enjoyment of others having an equal right to the enjoyment of their property, nor injurious to the rights of the community."

Following this theory, defendants contended that until the plaintiffs build into and actually possess the higher air, they cannot exclude navigation of the air. The defendants further made the point that public rights in airspace have been recognized by many authorities, such as the Air Convention of 1919, the laws of foreign countries, the United States Air Commerce Act of 1926, and legislative acts of some 40 states, including the Commonwealth of Massachusetts. The defendants therefore contended, since the airspace has been recognized as navigable, that Congress and the States have a right to subject private title of individuals to limitations and restrictions, so as to preserve the right of navigation in the air, as well as in the water, etc.

It should be added further that the plaintiffs contended that, if the Air Commerce Act of 1926 and the statutes of Massachusetts did in fact have the effect of creating the right of air navi-

gation over their privately owned land, such acts were unconstitutional as in violation of the Fifth Amendment to the Constitution of the United States and in violation of the Constitution of Massachusetts.

To this contention the defendants countered with the suggestion that Congress in the regulation of interstate commerce might interfere with the use of privately owned land, in the exercise of its police power and without compensation to the owner, unless the result of such an act would be to cut down the right to use the land for natural purposes to such an extent that it would amount to a taking. The defendants cited the cases involving federal works for the improvement of navigation where private owner's rights were temporarily, or permanently but slightly, interfered with.

The Decision

With the foregoing statement we may now consider intelligently the court's opinion. The court, after stating the facts as contained in the master's report and as to which there was no exception, stated:

"The case has been presented solely on the ground of trespass and the nuisance resulting from its continuance. No other question will be considered. The plaintiffs assert that the defendants have no right to fly their aircraft through the air space above their premises *at any height* and especially to fly at low altitudes."

This was not quite a correct statement. The plaintiffs did not contend for restrictions "at any height." They limited their contention to the facts shown in the master's report.

The court then goes on to state that it takes judicial notice and knowledge of the fact that aircraft and navigation of the air have become of great importance,

and that in the present status of the art it is impossible to confine flights to the space over existing public ways.

The court next proceeds to point out that the law of Massachusetts provides that aircraft should not be operated

"over any thickly settled or business district at an altitude of less than 3000 feet, or over any building or person at an altitude of less than 500 feet, except when necessary for the purpose of embarking or landing."

The court then added that the Air Commerce Act of 1926 provided that

"navigable air space means air space above the minimum safe altitudes of flight prescribed by the Secretary of Commerce under Section 3 and such navigable air space shall be subject to the public right of freedom of interstate and foreign air navigation in conformity with the requirements of this act;"

that in the regulations promulgated under the act, it is provided that

"exclusive of taking off from or landing on an established landing field . . . aircraft shall not be flown . . . except at a height sufficient to permit of a reasonably safe emergency landing . . . which in no case shall be less than . . . 500 feet."

Then comes a peculiar part of the opinion. The court says:

"These statutes and regulations recognize the existence of navigation of the air as an established condition. They *do not create* such navigation. They *do not authorize the taking* of private rights to promote such navigation."

Then in the next paragraph, the court says:

"The act of Congress and the statutes of this Commonwealth by plain implication, if not by express terms, not only recognize the existence of air navigation *but authorize* the flying of aircraft over privately owned land." (*Italics ours*).

The point might just as well be made here as anywhere. If there is a private

property in airspace and if the act of Congress does not authorize the taking of private property, then how can the act authorize the flying of aircraft through the privately owned airspace? The difficulty in answering this question, in relation to this opinion, is that the court does not in the fore part of its opinion expressly hold that the landowner does *own* the airspace. The court passes over that feature of the case by saying

"whatever may be the precise technical rights of the landowner to the air space above his land, the possibility of his actual occupation and separate enjoyment of it as a feasible accomplishment has through all periods of private ownership of land been extremely limited."

This would have been a most opportune time for the court to state just what were the rights of the landowner in his airspace. It is perfectly true that the possibility of actual occupation and separate enjoyment has been extremely limited. But a man's ability so to occupy and enjoy is constantly being enlarged by the science of construction and modern inventions.

The court says that nothing in the legislation referred to above limits in any way the right of the landowner to occupy his land by structures as high as he pleases. It might well also be added that nothing in the legislation referred to tends in any wise to limit whatever title, ownership or right the landowner may have in the airspace. The difficulty, of course, is just what is this title, ownership or right. Peculiarly enough, the court says:

"For the purposes of this decision, we assume that private ownership of air space extends to all reasonable heights above the underlying land."

It is unfortunate that the court used the term "private ownership," for this term has too well-founded a meaning.

One's concept of "private ownership" is necessarily that of privately owned land, or chattels. It indicates complete ownership. Some modification of its meaning is found, however, in the same paragraph, where the court says:

"It would be vain to treat property in air space upon the same footing as property which can be seized, touched, occupied, handled, cultivated, built upon and utilized in its every feature. The experience of mankind, although not necessarily a limitation upon rights, is the basis upon which air space must be regarded."

The court then goes on to cite the many cases illustrating the extent of legislative regulation in the exercise of police power, and finally holds that

"even with the utmost reasonable assumption as to the private rights in air space of the underlying land, the provisions of Statutes 1922, Chapter 534 (the Massachusetts Air Law) constitute valid regulations of the flight of aircraft in air space actually unoccupied by the owner of the underlying land."

We pause to comment that this statute may be a valid regulation of *flight*, but is it a valid limitation of "private ownership" in airspace?

The court expressly admits that the decisions quoted are not precise authorities in support of the view that the regulations found in the above act are valid as against the owner of the underlying land, but holds that

"the principles there declared require the conclusion that such flight by aircraft within the limits disclosed on this record is lawful against the protest of the owner of the underlying land."

The opinion then proceeds to say that what has been said with reference to the validity of the Massachusetts statute applies with equal force, as to interstate commerce, to the Air Commerce Act and that these two acts, limiting 500 feet as

the minimum altitude of flight, cannot rightly be pronounced to be in excess of the permissible *interference* with the landowner's rights under the *police* power.

It is certainly permissible at this point to inquire whether the court would have made the same holding if the height had been 400 feet or 300 feet or 200 feet. Practically every one knows that the regulations of the Department of Commerce and the various state acts, which have for the most part followed these regulations, were created not with any idea of recognition of property rights, but solely with an idea of insuring safety to occupants of aircraft and to persons on the ground. It is safe to say also that the question of noise and nuisance was not in the minds of any of these legislators.

If then the legislating and regulating authorities had decided that 200 feet was a sufficient height (as they might hereafter, if airplanes in the development of the art become more safe), could the court then consistently say that this was a "permissible interference" by valid exercise of the police power, particularly as the court later in the same opinion holds that flight at 100 feet is a trespass?

Logically enough, having started with the foregoing premises, the court reached the decision, *that flights of 500 feet or more over the land of the plaintiffs are not unlawful*.

While both the plaintiffs and the defendants treated the question of the right of flight as a single and indivisible question, whether at 100 feet or at 500 feet, the court *divides* this question into halves and, after reaching the conclusion above stated, that flights at 500 feet and above are lawful, proceeds to consider the question of flying at the low height of 100 feet. This is given a distinct heading as Part II of the opinion. The

beginning of this part of the opinion is as follows:

"The several defendants, except the Worcester Airport, Inc., in take-offs and landings have made flights over real estate of the plaintiffs at altitudes as low as 100 feet. In degree these flights approach much more closely to an interference with rightful enjoyment of land than do flights at the minimum altitude permissible for general travel . . ."

It might be pertinent to observe at this point that the same legislative enactment which the court holds to be a "permissible interference" at an altitude of 500 feet, expressly and in the same paragraph, grants the same right of flight at lower altitudes "when taking off and landing." In other words, if the above statutes are effective to grant a right, or rather if the right exists because of these statutes, then the right must, to be consistent, be also granted, or exist, in landings and take-offs at the lower altitudes.

The court distinguishes, however, between the 500-foot permission and the permission to fly at lower altitudes in taking off and landing by saying:

"The exceptions from minimum altitude of ordinary flight in favor of lower but unspecified altitude in taking off and landing do not seem to us to be intended as legislative limitations upon the rights of landowners in the air space."

We quite agree with the court in this statement, but we also believe that the grants of flight at 500 feet and above were likewise not intended as legislative limitations of the use of private property and, if so intended, would certainly be inoperative under constitutional safeguards. In fact, the court itself in the original part of its opinion stated:

"These statutes and regulations . . . do not create such navigation; they do not authorize the taking of private rights to promote such navigation."

But speaking of the exceptions in favor of lower altitudes, the court says:

"It would be a strained and unnatural construction to interpret them as designed to authorize interference with recognized property rights."

We respectfully inquire at this point that, if this be a strained and unnatural construction and if it is purely a matter of degree, why would not the limitation of 500 feet be likewise a strained and unnatural construction if interpreted as authorizing *interference with recognized property rights*.

The court then goes on to state:

"The bald question in the case at bar is whether aircraft, in order to reach or leave an airport, *may of right* fly so low as 100 feet over brush or woodland not otherwise utilized, against the protest of the owner."

In discussing this point the court cites many cases, holding that invasion of the airspace above the land *without contact with its surface* constitutes trespass. These cases are the well-known cases of eaves, cornices, roofs, leaning walls, wires, branches, etc., and incidentally these are the cases which in this country cite and apparently uphold the *usque ad coelum* maxim.

The court points out, however, that 100 feet is a low height; that trees in the vicinity frequently reach a height in excess of 100 feet; and finally concludes that

"the test suggested is not actual but possible effective possession. It is not decisive that the plaintiffs do not at the present make that possible effective possession a realized occupation."

We cannot help but interject at this point the thought that apparently the plaintiffs' rights in airspace are not impaired by the fact that they have not taken possession of the air to a height of

100 feet by way of buildings or by way of tall trees. Nevertheless, such things are possible. The suggestion might also be made that it is likewise possible to erect buildings to a height of 1,000 feet or 800 feet, etc., and consequently, if this reasoning is to apply, the plaintiffs' rights in their airspace should not be impaired because they have not built buildings 500 feet high. The court finally comes down to this statement, previously quoted at the beginning of this article:

"The combination of all these facts seems to us . . . to constitute trespass."

One would think that a decree would then immediately follow enjoining the defendants from these continued acts of trespass, but this does not follow. The court holds that because no *damage* was *proven*, injunction will not lie.

Nevertheless, in the cases cited by the court, which establish the doctrine that encroachment upon airspace by eaves, etc. is trespass, injunctions were granted. In particular, the case of *Butler v. Frontier Telephone Company*² awarded an injunction to prevent the stringing of wires over the plaintiffs' property, although no actual damage was shown. The cases holding that injunction will lie to prohibit repeated trespasses, even though no damage is proven, are too numerous to mention. In fact, as aptly said in *Burdick's Law of Torts*:³

"One who stands on his own land and . . . extends his arm over another's land is clearly liable for breaking the close of his neighbor."

It has never been, so far as we are aware, contended that the prohibition of trespasses by injunction was dependent upon proof of actual damage. Damages in trespass are presumed.

² 186 N. Y. 486 (1906).

³ 4th ed. (Albany: Banks & Co., 1926), p. 405.

The court, however, finally dismisses the plaintiffs' bill, holding as above stated, that there was no trespass by flights at 500 feet; there was trespass by flights at 100 feet; but there was no damage.

Apparently then the answer to the questions submitted at the beginning of the article are as follows:

1. The landowner does own the airspace to 100 feet; he does not own it beyond 500 feet; between 100 and 500 feet the matter is left undecided.

2. An airplane does commit trespass if it flies over private property at 100 feet or lower, even though it is landing or taking off from an airport; it does not commit trespass when flying over private property at 500 feet or above; the question of trespass *in between* these heights is left undetermined.

3. Trespass in the air can be enjoined only when actual damage is shown.

4. Congress or state legislatures may create a right of flight over private property at 500 feet or more, but may not create a right of flight (or has not) at 100 feet or less, *even for the purpose of taking off and landing*.

We feel that these answers carry their own evidence of inconsistency. The decision of the case by the court was correct; but the grounds upon which the decision was placed are, at best, unfortunate.

It would have been so much simpler for the court to hold that there is not actual title or "private ownership" in the airspace. The cases which have held that there is and which have announced an adherence to the *ad coelum* theory are, so far as air transportation is concerned, wholly and purely obiter. No such point was involved in any of the decided cases. The net result of adhering to this maxim of ancient days in the face of the progress of today is to create a right in favor of

the landowners which no court, with the right to speak, has ever given them. If the court had held that there was no such thing as title or ownership of the air, but that the landowner was limited to the exclusive right to take possession of the air column at his pleasure, and when he had taken possession, his right ripened into complete seizin, then subsequent disposition of the case would have been very simple.

The question of the height of flying, standing alone, would be unimportant. It would then be purely a question of nuisance. Flying at 15 feet above swamp lands or wooded tracts, entirely unoccupied or unused, should be no more of a trespass and no more of a nuisance than flying over homesteads at 1,000 feet. When, however, the proximity of houses, or of people, or horses, or cattle, render such flying fearsome or noisy or dangerous, it should be enjoined, solely on the grounds of nuisance.

We have not gone into a citation of authorities in this discussion because the briefs of both parties are a model of clarity of expression and a demonstration of unsurpassed industry. Every text book, brochure, statute and international treaty bearing on the subject has been fully presented to the court. Access to these briefs may be had, we are sure, when the opinion is fully reported.

It is to be regretted that the court did not see its way clear to break away from the shackles of the *ad coelum* theory, which has no place in modern law. The right to *possession* of the airspace is sufficient protection to the landowner for all practical purposes. It is not necessary to give him title. The law of nuisance fully protects him against air navigation which does in fact invade his personal rights. The question of trespass in the airspace without contact with the ground

could have been and should have been put forever at rest.

The decision, if followed to its logical conclusion, would require that before any aircraft could leave an airport it must be at a height of 500 feet. This is impossible in practically 90% of the airfields of the United States. It would require also that aircraft in landing should keep at a height of 500 feet until over the boundary of the airport. The master in this case found that these things were an impossibility in the present state of the art. We do not know what to say about the height between 100 feet and 500 feet. All we can say from the decision is that 500 feet is lawful and 100 feet is not. We might add that, although 100 feet is unlawful, such flight may not be enjoined unless damage is shown. This leaves also an unfortunate

situation. If it may not be enjoined, then the property owner's remedy against the trespasser is to sue for a recovery of nominal damages. He must file a new suit as often as he feels it is required, until he tires, or until the defendant tires, of paying \$1.00 and court costs in repeated actions.

It is nearly always unbecoming for a lawyer to criticise the opinion of a high court. We hold the opinions of the Massachusetts Supreme Court in the very highest respect. What has been said here was not said out of pique or resentment because we had no interest in the case, directly or indirectly, except as a student of the subject. Perhaps too much study has had its deleterious effect. We stand by our guns, however, to the extent of what has been said.

GEORGE B. LOGAN.

TORRENS SYSTEM UPHeld BY UNITED STATES SUPREME COURT

SINCE 1899 property owners in Cook County, Illinois, have had the option of registering titles to their lands under the Torrens system,¹ if they so desired. Relatively few of them, however, have used the system. The same is true in most of the other jurisdictions in this country, which have authorized Torrens registration, although the system is considerably more popular in British jurisdictions. Part of this lack of popularity in the United States may be attributable to certain doubts concerning the constitutionality of various ramifications of the several Torrens Acts, particularly their effect upon property rights as protected by the Constitution.

¹ Cahill's Illinois R. S., ch. 30, sec. 49, *et seq.* The first Illinois Torrens law, passed in 1895, was held unconstitutional but the second, passed in 1897 and left to the option of the counties to adopt, has been sustained

The question therefore arises: Will this most recent decision of the Supreme Court of the United States, upholding the validity of a Torrens certificate, tend to increase confidence in this method of land title registration and thus encourage its wider use?

The case of *Eliason v. Wilborn*² arose out of an alleged forged deed. Appellants (Eliason) owned and held a certificate for a certain piece of real estate. They wanted to sell this property to one Napleton, subject to a mortgage, and gave him a signed contract of sale, as well as their certificate. Appellants now allege that Napleton forged a deed to himself; presented this forged conveyance, together with appellants' certificate, to the

many times by the courts. The first registrations under the Act took place in 1899 in Cook County.

² 74 L. Ed. 549 (1930).

Registrar; received a certificate of title in his own name; and then proceeded to sell the land to the Wilborns (appellees). The Wilborns purchased the property from Napleton, and their "good faith is not questioned." After they had bought, but before the new certificate had been issued to them, they learned of appellants' claims. Appellants sought to have the deeds and certificates to Napleton and the Wilborns cancelled and a new certificate issued to themselves. This the Registrar had refused to do, and hence the suit to compel him to comply. Both the Circuit and the Supreme Court of Illinois had sustained the validity of the appellees' title and the appeal to the Supreme Court was based on the contention that

"the statute, construed as it was construed below, deprived the appellants of their property without due process of law contrary to the Constitution of the United States, by making the certificate of title issued by the Registrar upon a forged deed without notice to them conclusive against them."

But the Supreme Court affirmed the judgment of the lower courts.

The decision rested on two grounds. The first was at once the most important and of the greatest economic significance. It held that use of the Torrens system is voluntary but, once a landowner has chosen to put his land into the system or to buy land which is already registered, then the restrictions imposed by the Torrens Act become binding on the landowner. Originally Eliason had purchased registered land which meant that the title thereto was conclusive in the holder of the certificate and he knew this when he purchased. He could not, therefore, claim that his constitutional right to buy land and to be protected in that right had been impaired or taken away by the operation of statutory provisions

which he knew and to which he voluntarily subjected himself. The fact that he knew, or was presumed to know, of the risk involved amounted to a waiver of his right to be protected in his property.

The second ground was more purely legal, emphasizing that Eliason's negligence made possible the alleged forgery and therefore he must bear the loss.

On these two grounds the Court established the conclusiveness of a Torrens certificate to its holder, unless, of course, he had personally been guilty of fraud in securing that certificate. The fraud element, however, was of secondary importance in the decision, in spite of the fact that the immediate cause of the litigation was a forged deed. Mr. Justice Holmes rendered the opinion on broader and more fundamental grounds than the technical point of forgery.

The decision raises certain questions concerning its effect upon land transfers and the merchantability of real estate, and more especially the relation of the Torrens system to these matters. These effects may perhaps best be considered from the point of view of the parties to a real estate transaction.

To the owner, and therefore potential seller, of registered land this decision sounds a clear warning to guard his certificate with care. It is the thing which represents his interest in the land and which must not be parted with except through a complete transaction. In addition to this negative gain is the positive one of a firmer foundation in legal usage for his certificate. The decision, which establishes the conclusiveness of the Torrens certificate in the holder, gives to the owner a more merchantable commodity, one which would seem to be more desirable because of this new assurance of the validity of the title he can pass. This strengthening of the cer-

tificate brings land a step nearer to other commodities which may change hands merely by the transfer of a document.

This gain is shared likewise by the purchaser, who now has available a more secure purchase. He can rely on a Torrens certificate and be protected in it, provided he is a good-faith purchaser. This increased desirability of registered land suggests an increased demand for registered land and hence the wider use of the Torrens system. The position of the purchaser is further strengthened because he has available the alternative of title insurance. The conclusiveness of a Torrens certificate, as defined by this decision, gives him equal security at probably lower cost in the long run. This establishment of the conclusiveness of the certificate should also obviate the necessity, which some persons have felt, of securing title insurance in addition to their Torrens registration.

But what of defrauded owners like the Eliasons? Is the fear of being a victim of fraud going to operate against the spread

of the Torrens system? This decision does not furnish grounds for such a conclusion. Although the Eliasons lost in this particular suit, they were not without their remedy. This point is not discussed in the opinion but it is of economic significance as pertaining to the rights of owners of registered land. If such a defrauded owner proves forgery, as for example on the part of Napleton, he may recover from the Guarantee Fund established by the Torrens Act.³ He may not recover the land, which follows the certificate to the bona fide purchaser, but he may recover its equivalent in damages.

The net result of the decision, which is to exalt the Torrens certificate by making it conclusive evidence of ownership and causing land to follow the certificate when held by a good-faith purchaser, seems to be a strengthening of the system. The decision also illustrates the simplicity of the operation of the Torrens system; the certificate is absolute and the land follows the certificate. It thus establishes more firmly one of the major purposes of the Torrens system—namely, the creation of a simple, inexpensive, independent system of land title registration such that land title may readily be transferred.

HELEN C. MONCHOW

³ The Illinois statute (secs. 99, 100, 101) provides for the establishment of an indemnity fund out of which shall be paid damages for loss sustained by reliance on a Torrens certificate. The objection that the fund may not be sufficient to cover the loss involved may be answered by the fact that the County is liable to the extent of its taxable resources (sec. 101).

BOOK REVIEWS

Loucks, W. N. *THE PHILADELPHIA PLAN OF HOME FINANCING*. Chicago: *Institute for Research in Land Economics and Public Utilities*, 1929. pp. iii, 67. \$1.50.

The relative advantages of building-and-loan association operation under various plans, have long been under discussion; this monograph presents concisely but comprehensively the facts available respecting one of the most important methods. The reviewer believes from observation that most of the author's conclusions respecting the operation of the plan are correct, but that some of these conclusions are not proven by the information presented.

The topics covered are revealed by the chapter titles: the home financing problem; how and to what extent second mortgages on homes are financed; cost of second mortgages; costs in other cities; foreclosure experience; further tests of the plan; factors contributing to successful operation; weaknesses of the plan and its applicability elsewhere. A bibliography of over 50 references is appended.

One of the tests of the plan suggested is the relative cost of second mortgages to the borrower. The monograph contributes nothing toward the calculation of the true cost of second mortgages except to state fairly the items involved. This calculation is beyond the ability of the average building and loan secretary at the present time, and a simple method giving sufficiently satisfactory results should be popularized. The cost is usually considerably understated, as the author points out. His test of comparison is the relative cost of second mortgages; the reviewer believes a more practical test, as far as the home buyer is concerned, would be the relative cost

of the combined first-and-second mortgage financing. We may assume that the author has approximately arrived at the cost of second-mortgage financing in Philadelphia, but little definite information is available from other localities with which to compare these results, partly because of variation in methods of financing residence properties.

A second test is the foreclosure experience of Philadelphia associations. Unfortunately this monograph was written just before the most serious test of Philadelphia associations occurred. It is well-known that at the present time these associations are facing the prospect of having to take over by foreclosure large numbers of houses; real estate in Philadelphia is practically unsalable; and until very recently tenants have been almost unobtainable. The financial condition of associations depends very largely upon how they treated the inflated real estate values of the past. The number of foreclosures and extent of liabilities involved, as the author points out, are not conclusive indications of results, because associations adopt, where possible, various expedients to avoid foreclosing. They are busily devising ways and means to this end at the present time.

The author is probably correct that the experience of the Philadelphia associations with respect to insolvency has been no worse than the average for the country as a whole, though one may question how inclusive the information on this latter point is. But in this respect again Philadelphia associations have never in the past faced as great a problem as at present. One of the very advantages of the Philadelphia plan which the author cites, the ease of

financing home ownership and the consequent encouragement of real estate operations, combined with the real estate slump, has contributed to the present difficult situation of the associations. Refusal of associations to follow the inflated values of the past would have been an appreciable check upon speculative real estate operations, but the relations between realtors and building and loan associations in Philadelphia are very close, and the optimistic views of the former are readily transmitted to the latter.

When the size and conditions of the city are considered, the ownership of homes in Philadelphia is undoubtedly extensive, and the building and loan association has been a contributing factor. Whether persons are encouraged to buy homes who should not, whether borrowers from associations are satisfied, are questions which cannot be answered from the information available. The answer to the former largely depends upon what real estate prices happen to be at the moment; the answer to the latter probably is that the borrower, not knowing what the true cost is, has no means of intelligently gauging his situation. The author's statement that, "probably the plan does play some part in speculative real estate activity, especially during periods of rising real estate values," will be supported by those who are familiar with the history of associations.

Yet in spite of obvious criticisms, and in spite of the present severe trial, local sentiment remains highly favorable to the present plan of operation; the consensus of opinion seems to be that, if associations are conservatively managed, if real estate operators are prevented from dominating association policies, and if directors are induced to take an active and independent interest in man-

agement, they may and have been operated both profitably and in the public interest.

The author has summarized very well the possible weaknesses of the Philadelphia plan, although the reviewer does not agree with him that longer maturities for shares would ultimately result in higher cost to borrowers; they would result in lower return to investors, since surplus funds would tend to reduce the premiums on future loans. The conclusion that second-mortgage loans are not as risky as commonly supposed would seem to be supported by Philadelphia experience.

With certain statements scattered through the book the reviewer disagrees. For example, to state that one of the advantages of the plan is that the borrower can repay all or part of the loan at any time and to add in the footnotes that this involves the loss of some of the earnings on the shares to date is in substance a contradiction of ideas. The results would depend upon how much earnings were lost. The percentages which associations customarily lend on second mortgages mean little without some idea of the valuations placed on the properties. The author's suggestion that the evil of commissions paid to persons for "placing" loans with associations might be easily eliminated by the borrower applying directly to the association is obvious but unsatisfactory, because it assumes a knowledge and self-reliance, the lack of which is directly responsible for the present practice. The author is to be praised, however, for the frank way in which he has faced this troublesome question.

Several features connected with the Philadelphia plan deserve more emphasis than they have received: whether fines for late payment of dues are excessive; the question of the proper penalty for

premature withdrawal; the matter of proper supervision and regulation and the regular publication of reports; the relation between real estate agents and associations. The solution of the commission problem still remains to be found. The real cost of second-mortgage loans should be furnished by associations. It would be interesting to know the effect of withdrawals and fines upon profits under the plan.

This study, however, is the most adequate critical presentation thus far of the actual operation of the Philadelphia plan and should be of considerable interest to those who are familiar only with plans differing widely in purpose and in application. It presents side-lights unobtainable except from an unbiased person who has observed the plan in operation. The study is to be praised highly for its frankness and impartiality. It is simply and understandably written and might be read with considerable profit, even by those connected with Philadelphia associations. To those familiar only with other plans it offers interesting suggestions, and to stockholders in Pennsylvania associations much enlightenment on the broader aspects of their business.

ROBERT RIEGEL.

Dorau, Herbert B. *MATERIALS FOR THE STUDY OF PUBLIC UTILITY ECONOMICS*. New York: Macmillan Company, 1930. pp. xxii, 975. \$5.00.

This book of readings, the first of its type, is offered by its editor and the Institute for Research in Land Economics and Public Utilities, as an aid in the modern program of public utility education. It measurably fulfills this purpose. Universities are fast becoming public utility "conscious," and the development of a more or less definite public utility "economics" is now well under way. Care must be taken, on the

one hand, lest this new "economics" prove too grasping—reaching out to claim as its own matters not peculiar to these industries—and, on the other, lest it cast out or slight as "non-economic" matters which should find a place in a well-rounded program of public utility instruction. This care has been exercised in the distribution of topics throughout the 952 pages of the present work. Successive chapters deal with historical development, organization, "units and measurements", economic characteristics, legal status, regulation, cost of service, labor, taxation, valuation, depreciation, capitalization, rate of return, cost of capital, revenue, price schedules, and ownership. The text material is augmented by the inclusion of 188 charts and tables.

The outline of subjects and the relative emphasis placed upon them in a work of this sort inevitably give rise to reasonable differences of opinion. The reviewer, for instance, would have been inclined to snatch some of the pages from the opening chapter as well as from other points throughout the book in order to establish a section on the constitutional background of regulation; to augment the few pages allowed to "ownership," and materially to extend the treatment of regulation. Others, undoubtedly, would prefer other arrangements; that adopted by Dr. Dorau is distinctly defensible.

The gathering, combing, and selection of materials and their arrangement within each chapter—really the heart of the editor's task—has similarly been accomplished with a high degree of success. Dr. Dorau has not strained the limits of the range within which the individual compiler may properly indulge his personal tastes. Perhaps the most striking innovation is the omission of selections from the opinions of courts

and commissions, an omission which might seem to call for some prefatory explanation. The relative availability of this material both in official reports and in other collections may have prompted its exclusion here; no other reason suggests itself for the failure to include readings possessed of such positive and, frequently, unique value. Dearth of suitable material may account in part for the comparative inattention accorded to such regulatory problems as control of abandonments and extensions, management and intercorporate relationships, motor transport and the "borderline" industries. Yet there have been significant writings on these topics. Something rather definitely along the Raushenbush or Mosher line, questioning the efficacy of current commission regulation, would have been welcome—just to introduce a note of rational discontent and to suggest the existence of a basic present-day problem. And might it not have been well, in the chapter on valuation, to place an excerpt from Bauer or Bonbright in juxtaposition with that from Brown?

These comments suggest no serious defects. The positive merit of the book is obvious. That a hearty welcome awaits it will not be questioned by anyone who has struggled to assemble in suitable form supplementary material for college classes in public utilities. Even those well trained in the general field will discover in this collection many readings on specific phases of the subject for the first time. Dr. Dorau has brought together, with a minimum of duplication, representative, valuable and timely selections; and has adapted and linked them so skillfully that his work must be given serious consideration as a possible text quite apart from the wide use as collateral reading which it is bound to receive. BEN W. LEWIS.

Moulton, Harold G.; Morgan, Charles S.; and Lee, Adah L. *THE ST. LAWRENCE NAVIGATION AND POWER PROJECT. Washington, D. C.: The Brookings Institution, 1929. pp. xvi, 672. \$4.*

This useful volume representing the work of a number of individuals over a period of several years, marshals the facts and arguments concerning the economic soundness of the proposed St. Lawrence navigation and power development. Beginning with a brief review of the movement for a deep waterway, the book considers in greater detail the technical and economic practicability of various proposals. Inquiry into channel depths reveals that 27 feet is a minimum requirement for the waterway. The capital investment and annual charges of such a waterway are then estimated, as well as the traffic possibilities. Dr. E. G. Nourse's analysis of the arguments advanced for the waterway as an agency for agricultural relief results in the conclusion that the benefits to farmers would be at most only a fraction of those usually expected.

The waterway is not thought to be necessary in order to relieve railway traffic congestion, in view of the adequacy of railway service in recent years together with a substantial reserve of carrying capacity and good prospects of even higher standards of railway operation in the future. Furthermore, the traffic capacity of the waterway is far less than the estimated capacity of new railroads running from Chicago to Boston which could be constructed at a cost equivalent to that of the waterway.¹

¹The assumptions upon which these estimates and comparisons are made are subject to serious question. The theoretical, double-track railroad is to operate trains of 50 cars of 40 net tons moving in both directions at 5-minute intervals, with suitable terminal facilities. It is estimated that such a road would cost \$260,000,000, and the fixed charges plus maintenance of way

(Footnote 1 continued on page 331)

As a means of regulating railway rates, water-route competition is considered costly and ineffective.

Only 23 pages are devoted to a discussion of the water power aspects of the development. The findings are based upon a report made by the engineering firm of Sanderson and Porter. The chief conclusion is that it would not be economically justifiable at the present time for the United States to develop its share of the International Rapids section and to transmit power to New York or to New England.

A summary chapter attempts to

(Footnote 1 continued from page 330)

would be \$20,000,000 annually. Questions arise both as to the validity of the assumed traffic density, and as to the estimated costs. Mr. Lesslie R. Thomson places the capital cost at about \$1,000,000,000, and the maintenance of way and fixed charges at many times \$20,000,000. But even this would not be sufficient since a four-track road would be necessary under the unique traffic density assumed. See Lesslie R. Thomson, "The St. Lawrence Navigation and Power Project," 38 *Journal of Political Economy* 86-107 (February, 1930) for additional data on the entire project.

"draw together the various threads" of the analysis and "present the conclusions to which the investigation as a whole appears to lead." In effect these are: first, that the power development is still a matter waiting upon growth of markets; and second, that the navigation project cannot be upheld upon economic grounds.

In addition to the analytical and expository sections, the book includes a series of appendices comprising almost two-thirds of the entire volume. These cover diplomatic correspondence, traffic analyses, the production and movement of basic raw materials, manufactures and food products, and the report of Messrs. Sanderson and Porter on the power project in the International Rapids section. For independent students of the navigation and power problem, the appendices are perhaps the most valuable section of the volume. A useful bibliography is lacking.

HUBERT F. HAVLIK.

BOOK NOTICES

Erdman, Henry E. *AMERICAN PRODUCE MARKETS*. Boston: D. C. Heath and Company, 1928. pp. xii, 449. \$3.40.

As its title indicates this book is confined to a discussion of the marketing of fruits and vegetables, dairy products, and poultry products. The analysis is on a high level and a clear and effective style prevails throughout. The major part of the treatment is orthodox and generally speaking familiar to students of marketing, since it uses the institutional-functional approach first introduced by Weld in his *Marketing of Farm Products*. Indeed one is impressed with the fact that in large degree the problems presented do not differ materially from those found in the more general works on the marketing of farm products. This is a bit startling since the book is confined to but one group of farm products—namely, those that go through to the final consumer with little or no processing. Prob-

ably, these familiar elements come, on the one hand, from the similarity of problems, such as concentrating and equalizing, which are common to most farm products; and, on the other hand, from the necessary use of commodities here discussed as illustrations, in general marketing texts, of the subject of dispersion.

If the reviewer were to stop at this point he would say that the faculty shown by the author for careful analysis and clear exposition makes this book a valuable contribution to the literature of agricultural marketing. But there are also certain definite contributions, some minor and some major, which clearly distinguish this book from existing general works on the farm market.

Chapters VII and VIII on the auction method of selling are particularly good, and the discussions of the f. o. b. auction and of the various types of local auction are by far the best the reviewer has seen. The discus-

sion of produce exchanges and future trading (Chapters IX and X) is also outstanding among brief treatments and is of particular value because it is in terms of produce, whereas most general discussions deal with these subjects from the point of view of the grain and cotton markets. Specialization, diversification, and integration are interestingly treated in a separate chapter which can be profitably read by all students of marketing. Much of the chapter on cooperation follows the author's earlier analysis of the possibilities and limitations of cooperation.¹ It is well done.

The chapter on cost of marketing strikes the reader with a bang! It is no assignment for a day's casual reading for the class in marketing! The relatively easy reading of the previous pages now becomes difficult. But this is due to the difficulty of the subject and the compactness with which it is necessarily treated. The outstanding characteristic of the chapter is the way in which the author has developed the various uses of cost data, and their limitations. The subject is introduced with a definition of terms, a discussion of the problems of cost accounting which apply, and the uses of cost data. The next section is devoted to margins, spreads, the consumer's dollar, costs; and, among other things, the weakness of the "consumer's dollar" concept is presented. This concept does not, the author states, "give a true picture of the comparative costs of doing business at different stages of the marketing process and is not satisfactory as a measure of efficiency." Since the consumer's-dollar concept is often used for just these purposes in popular and semi-popular and even some more serious writing, this section is particularly important. The discussions of other popular expressions—the farmer's "35-cent dollar," and "why margins vary"—are also helpful.

Section three of the same chapter is devoted to the relation of size of business to costs and profits. Although this is also enlightening, the reviewer feels that it is incomplete because it does not discuss the closely related topic of the connection between the volume of business of an individual firm and the firm's fixed costs—a thing commonly confused with scale of operation.

For whereas a business organization operating at most economical capacity is presumably operating at lowest cost for a business of that size, the same enterprise operating at 75 per cent. of such capacity may be operating at a high cost. In fact, much sales effort is energized by just this need to get business enough to use a given organization at its most economical point of operation. For example, an organization set up to do a normal business of 100,000 units may be the most economical size for the industry, but if the concern does only a 75,000-unit business its costs per unit will increase—in fact, they will probably be higher than those of a business geared to operate most economically at a 75,000-unit capacity.

FRED E. CLARK

FARM INCOME AND FARM LIFE. Dwight Sanderson, editor. Chicago: University of Chicago Press, 1927. pp. xi, 324. \$2.40.

This book is a symposium of papers presented by 38 authors, written at the request of a joint committee appointed by the American Country Life Association and the American Farm Economic Association. The first question asked was, "What is the measure of rural progress?" The answers of the authors can be summarized: (1) increased technical efficiency; (2) a better standard of life, health, education, including more leisure time and ability to use this leisure, and increasing personal satisfaction with rural life per se. The goal of economic efficiency is considered by several authors who make it clear that this includes the maintenance of a high standard of living, as well as maximum production at lowest costs. The point is emphasized that farmers must not only recognize but also demand a high standard of living. Better living is considered a stimulus to better farming and better business. As to the influence of competing groups on this standard it is agreed that, in the intensively cultivated crops, farmers with a low standard of life are able to drive out and lower the standard of other farmers. Immigration laws and land laws are somewhat controlling this situation; but the relative prosperity of industry is more potent, affecting agriculture by giving it a decreased share of the national income—partly the result of greater technical efficiency making possible greater production on fewer acres, with smaller man-power.

¹ H. E. Erdman, *Possibilities and Limitations of Co-operative Marketing*, California Agricultural Experiment Station Circular 298 (1925).

Beginning with the tenth chapter, the relation of economic and social well-being to the land factor is treated, showing the relationship of submarginal land to these factors. This is further analyzed for the super-marginal lands by relating them to types of agriculture; especially the association of income, leisure, and opportunity for social contacts as affected by the kind of farming—for instance, dairying. Several authors agree that social conditions are below standard where tenants predominate, but no direct evidence shows tenancy to be the cause of these conditions. It is maintained that cooperation has difficulty in succeeding in an unsocial community, but also that organization for "better business" will help to bring about better social life. The economic aspects of health, the relation between economic success on the farm and the amount of education of the farmer, the relation of success to sociability, and the beautiful in rural life, are among the last chapters of the book, which closes with a discussion of the non-economic motives of farm life.

GEORGE S. WEHRWEIN

Locklin, D. Philip. *RAILROAD REGULATION SINCE 1920*. Chicago: A. W. Shaw Co., 1928. pp. vii, 198. \$3.

The field of railway regulation is constantly changing and expanding, so that most texts on railway transportation in general and on regulation in particular soon lose much of their usefulness as up-to-date material. As a supplement to the more general works, Professor Locklin's little book is decidedly valuable. Without attempting to cover in detail all the controversial phases of regulation, he has shown the major developments since 1920 in an interesting and well-organized manner. Beginning with a general outline of the Transportation Act, he has carefully classified its provisions and has shown, in a clear and concise form, their interpretation and significance to 1928.

The book is "primarily descriptive." As stated in the preface, "the author has not gone out of his way to pass on the wisdom or folly of all provisions of the Transportation Act and related facts, nor of the various regulatory policies adopted by the Interstate Commerce Commission. On the other hand, the author has not refrained from criticisms and suggestions which seem to him clearly justified in the light of the facts."

Mr. Locklin divides his treatment under the headings: (1) Financial Aid, (2) Rate Regulation, (3) Hoch-Smith Resolution, (4) Regulation of Service, (5) Intercorporate Relations, (6) Financial Regulation, (7) Labor, (8) Valuation, (9) Depreciation, and (10) Important Rate Controversies. For each topic he outlines the provisions of the Act (or of subsequent legislation) and shows the interpretation by the Commission and courts and the results of the legislation and interpretations to date. Exception might be taken to his opinion of the effectiveness of the Hoch-Smith resolution, which he believes already to have been far-reaching, but which in the opinion of the reviewer has been of little account. His valuation chapter is by no means comprehensive, but, as he points out, "critical discussion of valuation problems has particularly been avoided because within the limits of this book the question cannot be exhaustively argued." This chapter would, however, be more effective were more attention given to the trend of Supreme Court opinion on the fair-value question. The O'Fallon case is described up to the appeal to the Supreme Court.

To the reader or student interested in making a thorough study of some particular phase of regulation, the treatment in the book will appear sketchy and inadequate. But as a convenient summary, well-organized and with important matters well-emphasized, it should be very useful to those who wish to keep generally up-to-date on the whole field. It is to be hoped that the author will revise the book from time to time, so that it will continue to be what its title indicates. A useful, but by no means comprehensive, bibliography is attached.

HERBERT E. DOUGALL.

Child, Stephen. *LANDSCAPE ARCHITECTURE*. Stanford University: Stanford University Press, 1927. pp. xiv, 279. \$7.50.

Stephen Child presents in this book an extremely interesting and informative treatment of the subject of landscape architecture. He sets forth the principles of landscape architecture in a series of letters which discuss 12 typical problems. In Mr. Child's words, these letters "are the idealized correspondence of a landscape architect with his client, a representative American, whose successive opportunities are those of a

modest home-dweller who at length becomes a City-Planning Commissioner."

The text is singularly free from the technicalities which are so confusing to the lay reader in most other books on the subject. The fundamental elements of landscape design applicable to the type problem are set forth clearly and simply and in logical order at the beginning of each letter. There are abundant plates and figures to illustrate the context of the letters.

In his first letter, Mr. Child discusses the problems of modest home grounds. His successive letters deal with the problems of garden design, large home grounds, a group of little homes, hotel grounds, a neighborhood of modest homes, village improvement and a small park, playgrounds, a rural park for a large city, a system of parks for a large city, metropolitan parks and city planning.

Following the letters are a series of notes treating in greater detail certain points touched on in the letters. This method of presentation prevents cluttering the text of the letters with detail and yet saves for the reader the benefit of added discussion of certain points upon which he may desire further enlightenment.

There is also a bibliography of books relating to various phases of landscape architecture: theory of design; history and description; types of landscape design and planting. This bibliography should be very helpful to the reader who wishes to peruse the subject further. The reader will find, too, that the index is well arranged for cross reference.

One of the most significant things which Mr. Child does is to demonstrate clearly the true meaning of landscape architecture as it has been defined by Charles Eliot, "the art of arranging land for use and the accompanying landscape for enjoyment." He shows that landscape architecture includes much more than the setting out and caring for plants. This work is that of landscape gardening and as such it simply covers part of the work of landscape architecture. The latter includes land planning as an essential part of its field.

Mr. Child, too, emphasizes the relation between landscape architecture and architecture. He states very distinctly in his foreword that one of the purposes of the book is "to impress upon the average intelligence through a clear statement of basic principles the fact that art influences govern; to demon-

strate, moreover, that the services of the landscape architect are co-equal with those of the architect, and that true economy for the setting of the simplest home depends upon art principles and is furthered by professional advice." He indicates a rapprochement of land planning, landscape gardening and architecture.

Because of the increasing regard for the aesthetic in the development of American building and landscape, *Landscape Architecture* should be well received. It should be a valuable addition to anyone's library.

ALBERT G. HINMAN.

Warshow, H. T. (Editor) REPRESENTATIVE INDUSTRIES IN THE UNITED STATES. New York: Henry Holt & Co., 1928. pp. xiii, 702. \$5.00; students' edition, \$4.00.

The editor of this book has secured contributions about selected industries from men who have been actively connected with the development of the particular industry. "The contributions follow a uniform outline and cover in a general way a brief history of the industry, the conditions surrounding its origin in the United States, its relation to American industry as a whole, the growth of its domestic trade, the improvements in technological processes, the growth of its export business, a discussion of its labor problems, a brief history of large consolidations or combinations, and any special developments peculiar to the individual industries."

Not all the important industries are included but the selection is made so as to cover those which are basically related to all industries. For example, the raw material industries are represented by aluminum, copper, iron and steel, lead and mixed metals, zinc, lumber, petroleum, rubber, cotton, wool, and leather. Industries which touch many others are included: banking, chemical, electric and water power, construction, paint, meat-packing, automobile and railway equipment industries.

The discussion of each industry is supported by statistics and dates are given in the historical development. The names of the business organizations most active in the history of an industry are included together with intercorporate relationships. Technological development is explained descriptively but sufficient detail is given to interest the specialist. Markets form the

connecting link between production and application and are presented in relation to the growth of the industry and its organization.

In these days of inter-industrial competition, specialists in a particular industry will find the book valuable in giving a perspective. To the student of business economics and economic history, the book gives an excellent grouping of material.

E. O. MALOTT

Berle, A. A. Jr. *STUDIES IN THE LAW OF CORPORATION FINANCE*. Chicago: Callaghan & Co., 1928. pp. xvii, 199. \$3.50.

Wormser, I. Maurice. *DISREGARD OF THE CORPORATE FICTION AND ALLIED CORPORATION PROBLEMS*. New York: Baker, Voorhis & Co., 1927. pp. xxi, 199. \$2.50.

These two books illuminate one of the most important present-day problems of business. They are largely collections of previously published articles in legal periodicals. Both authors deal with the general problem of the legal status of a corporation; they supplement each other in that Professor Wormser on the whole has a conservative point of view whereas Professor Berle crusades for the views of the minority. The central issue discussed is what legal and/or equitable rules should be adopted for the control of the constantly changing, modern business relationships which are focused in the corporation.

Professor Wormser in his first chapter discusses the uses to which the legal doctrine of corporate entity has been put and poses the question: When should the court look behind the fiction of corporate personality in order to prevent undesirable business practices? This theme is elaborated in the second chapter which he entitles "Piercing the Veil of Corporate Entity." Here he shows how the courts have discarded the entity theory in order to deal equitably with fraudulent uses of separate corporations. He makes clear the tendency of some courts to look behind the corporate fiction in order to adjust the conflicting interests of groups of persons within the corporation as an economic enterprise. In other chapters, Professor Wormser discusses the legal status of joint stock associations, the power of the corporation to acquire its own stock, the legality of voting trusts and pooling agreements, and the question whether courts

may compel directors to declare a dividend. With his lucid style he summarizes the conflicting interpretations of the courts and expresses his sympathy for those rules which are deemed ethical in the light of current standards of business management.

Professor Berle goes to the heart of the present tendencies in corporate management, showing the financial problems raised by the divorce of ownership from control of the corporation. This was the issue raised in dramatic and popular form by Professor Ripley in *Main Street and Wall Street* which created, as will be recalled, a distinct shock in the financial world and set in motion influences for reform.

Professor Berle's main thesis is that since those who have staked their capital in a corporation have by one means or another parted with direct control of their property the courts should, recognizing this situation, impose upon the controlling powers fiduciary obligations toward those whose property they manage. Clearly this tendency is in the direction of putting the real managers of a corporate enterprise virtually in the position of trustees so far as the obligations imposed upon them are concerned—a view entertained in Massachusetts as early as 1807 in a case involving preemptive rights of stockholders, and a view held by English courts prior to 1800.¹ Professor Berle, however, would widen the application of this principle to most, if not all, the varied recent forms of intracorporate relations. He discusses, for example, "non-voting stock and 'bankers' control," the control of participation rights when non-par stock is used, the sharing of surplus with non-cumulative preferred stockholders and of dividends with participating preferred shareholders, the protection of the value of stock purchase and conversion option rights, and that always troublesome question of how far corporate officers should go in taking advantage of inside information affecting security values. In the interpretation of cases Professor Berle has probably strained the law somewhat to justify his main thesis. Nevertheless, his vigorous discussion presents a point of view which sooner or later investment bankers and corporation promoters and managers must heed. This is particularly important for some affluent

¹ Samuel Williston, "History of the Law of Business Corporations before 1800," 3 *Select Essays on Anglo-American Legal History* 95.

utilities whose responsibilities to the investing public at times seem to be rather dimly perceived.

Professor Berle attacks the legal fictions conveniently developed by the courts along a broader front than does Professor Wormser. Not only does he plead for disregarding the corporate fiction itself but also for looking behind the fiction that the relations between a corporation and its stockholders are contractual, the fiction that the state exercises supervision over the charter and the fiction that the voting stock controls the election of the management. He explains that these fictions must be disregarded because modern corporate promoters and merchandisers of corporate securities have dressed their commodities in an exceedingly varied assortment of covers beneath which only the initiated can discern how economic power is concentrated in a few hands against whom, when unscrupulous, the innocent security buyer has little security and small hope of redress. The old legal fictions stand in the way of remedying wrongs done participating preferred stockholders or bond or debenture holders whose security is siphoned away by the use of subsidiaries, for example. We may grant that the practices described by Professor Berle are those of an unethical fringe; yet these are the very ones who may bring even the scrupulous into disrepute, especially with the wide diffusion of security ownership.

As an illustration of the length to which

Professor Berle goes in urging his thesis the following may be quoted:

"The writer believes that any intracorporate dispute is now cognizable in equity as a matter of course just as is a dispute under a trust deed. Further that the law will affect the controlling influence in a corporate situation with fiduciary duty wherever this influence is found."

Professor Wormser takes a position not nearly so advanced as this. He stays much closer to the prevailing judicial views of fraudulent conduct. Again, for illustration, he arraigns the Illinois courts for their hostility to voting trusts, revising the favorable attitude taken before the Pujo Committee disclosures. Professor Berle, on the other hand, draws his definition of reasonableness fairly tightly around the interests of credulous and largely powerless investors.

However desirable from the ethical point of view may be such a reform of judicial attitude as Professor Berle urges it can hardly be described as a universal tendency in this class of court cases, despite some striking recent adoptions of his views. Nevertheless, Professor Berle has performed an exceedingly valuable task in raising the issue and provoking discussion. It is to be hoped that in this discussion economists will share, especially in directing attention to the economic consequences of the several applications of the fiduciary rule. The subject is particularly worth examination by those who are participating in the current "golden age" of the electric industry.

E. W. MOREHOUSE.

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